33rd Year

MAY, 1949

RUBBER AGE

TECHNOLOGY DEPARTMENT

PRINCETON LABS.
MAY 9 1949
RECEIVED

AGERITE

ANTIOXIDANTS

ALBA — Minimum discoloring and Non-staining. Bleaching action in light colored Neoprene stocks.

GEL — Antisunchecking material. Processing aid for Neoprene.

HP — Antiflex cracking.

POWDER — General purpose antioxidant.

RESIN D — Heat resistance. Non-blooming.

STALITE — Liquid general purpose. Very low staining or discoloring.

WHITE — Strong antioxidant. Copper inhibitor.

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

Use the Du Pont Antioxidant that Fits Your Needs

	FOR PROTECTION AGAINST		
	NORMAL AGING	HEAT AGING	FLEX FAILURE
1 NEOZONE A	Excellent	Good	Good
2 AKROFLEX C	Excellent	Excellent	Very Good
3 THERMOFLEX A	Excellent	Excellent	Excellent
4 ANTOX	Very Good	Very Good	No Effect

1

NEOZONE A—As a general-purpose antioxidant, Neozone A is outstanding in effectiveness and economy. It provides excellent protection against normal aging and improves the heat-aging and flex-cracking resistance of both natural and synthetic rubber stocks. Equal antioxidant protection may be obtained using Neozone D. However, Neozone A is much more soluble in elastomers, hence is preferable.

2

AKROFLEX C—Second only to Thermoflex A for protecting stocks against all three types of deterioration. Gives protection equal to Thermoflex A against normal aging and heat, but is slightly less effective against fatigue failures.

3

THERMOFLEX A—For applications requiring *maximum protection against all three types of deterioration* . . . normal aging, heat, and flexing . . . Thermoflex A is unmatched. Especially effective as an inhibitor of flex cracking. Specify Thermoflex A for difficult jobs where only the best antioxidant protection will do.

4

ANTOX—Produces excellent aging stocks which discolor only slightly on exposure to sunlight. Antox also results in stocks having very good heat resistance. And, too, Antox activates cure . . . reduces accelerator requirements.

DU PONT RUBBER CHEMICALS

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. . . THROUGH CHEMISTRY

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THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. May, 1949, Vol 65, No. 2.

TECHNOLOGY DEPARTMENT

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1. Abrasion Resistance—50% greater than crude rubber.
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4. Minimum Cold Flow—even at elevated temperatures.
5. Low Temperature Flexibility—down to −65° F.
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GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

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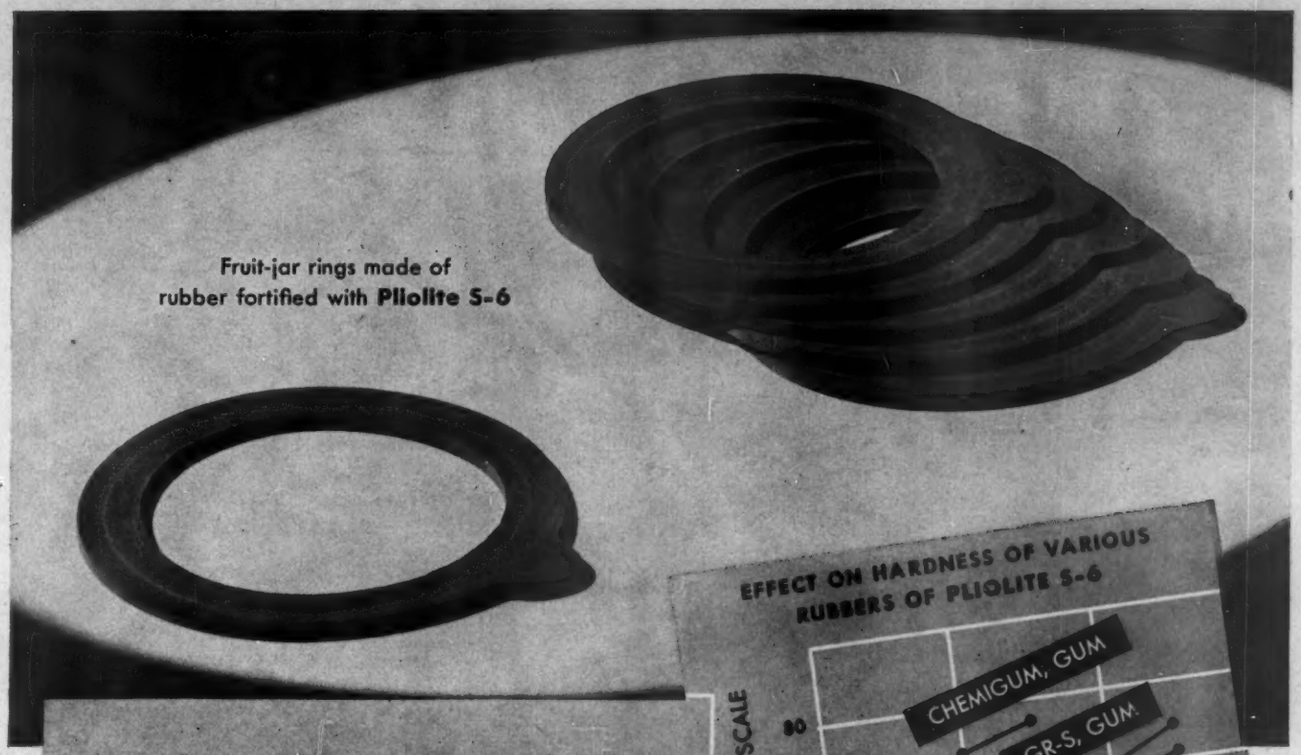
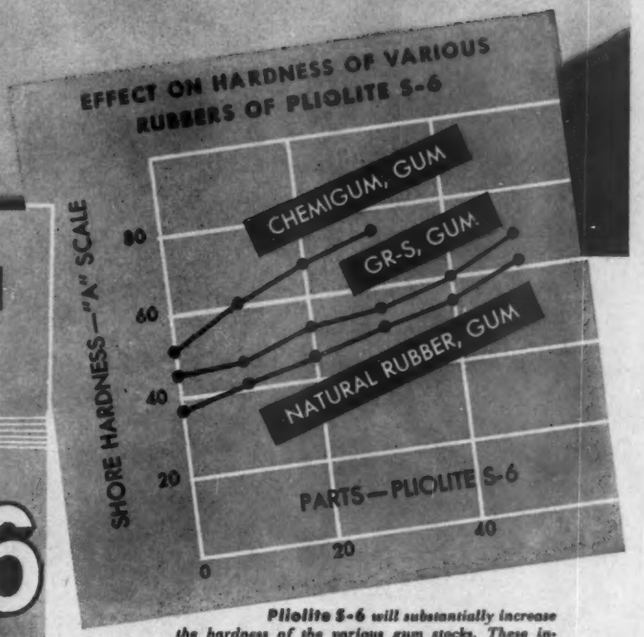


Fruit-jar rings made of rubber fortified with **Pliolite S-6**

For harder, light-colored rubber stocks use

PLIOLITE S-6



***Pliolite S-6** will substantially increase the hardness of the various gum stocks. These increases are proportionately maintained when the resin is used in highly loaded black or non-black compounds.*

To add needed hardness to gum, colored or black natural rubber — and to synthetics as well — you can use **Pliolite S-6** with confidence. The chart shows you how varying percentages of **Pliolite S-6** copolymer resins added to various stocks produce a marked rise in Shore A scale hardness.

Users know that when **Pliolite S-6** is added to a stock, very high-hardness values can be obtained while the stock still keeps excellent toughness and durability. And **Pliolite S-6** helps eliminate scrap. It acts as a plasticizer at elevated temperatures, improves calendering and plate polishing. And it prevents shrinkage as the stock cools.

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Pliolite S-6 can be obtained as a powder for your own mixing, or in master batches. Write for sample and full details to Goodyear, Chemical Division, Akron 16, Ohio.

USE PROVED *Products*

GOODYEAR

Pliolite, Chemigum (pronounced Kem-o-gum)—T. M.'s The Goodyear Tire & Rubber Company

New answer to the "scorch problem" ..in tire tread processing

HERE'S a new and successful accelerator-retarder combination for rubber compounders. It permits use of *all* the advantages of reinforcing furnace blacks in natural rubber tire tread formulations— *without scorching.*

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2. Good flex life and high abrasion resistance.
3. Improved resilience and compression set.
4. Easy handling and processing.

Good-rite Erie is an excellent delayed action accelerator. Good-rite Vultrol is a highly effective retarder at processing temperature.

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GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

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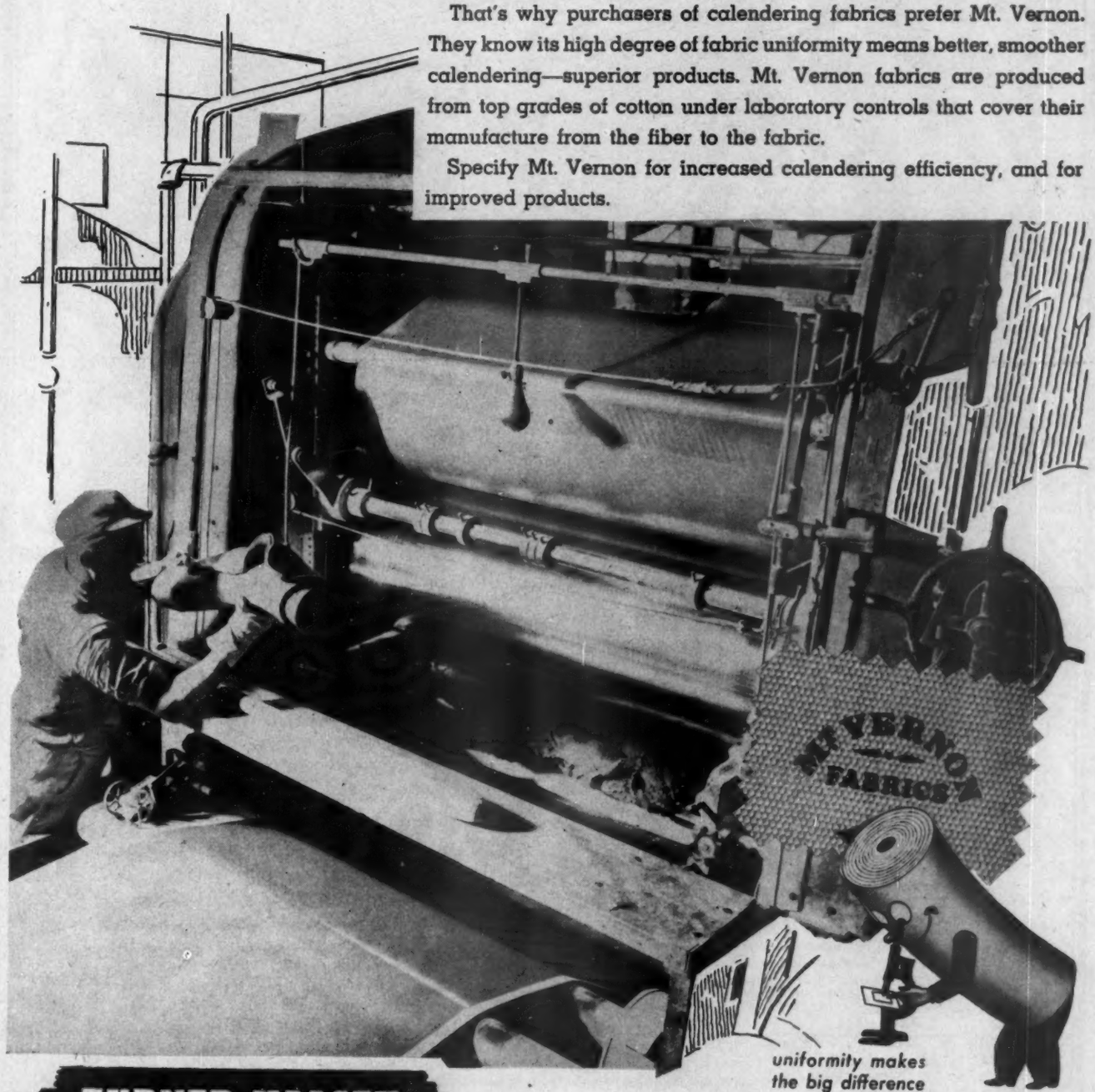
The smooth, continuous operation of your calendering machines depends to a large extent on the quality of the fabric you use.

That's why purchasers of calendering fabrics prefer Mt. Vernon. They know its high degree of fabric uniformity means better, smoother calendering—superior products. Mt. Vernon fabrics are produced from top grades of cotton under laboratory controls that cover their manufacture from the fiber to the fabric.

Specify Mt. Vernon for increased calendering efficiency, and for improved products.



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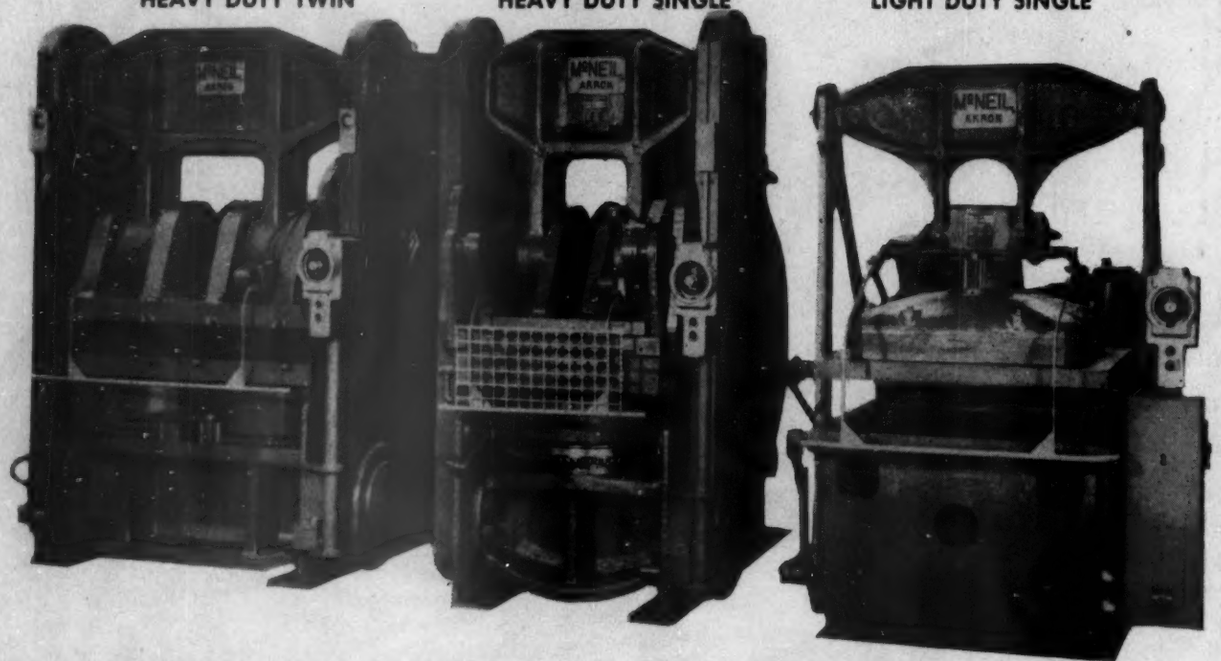

MOTOR OPERATED — NO HYDRAULIC — SIMPLE SPEEDY ADJUSTMENT OF PLATENS

- 800,000 pounds total pressure
- Two 24" x 24" drilled platens individually adjustable 1" minimum—6" maximum
- 700 pounds per square inch platen pressure
- Adjustments for mold loadings—zero to 200 tons each mold position
- Two 24" x 24" molds may be used in same or different thicknesses or one 24" x 48" mold

- 800,000 pounds total pressure
- 32" x 32" drilled steam platens
- 780 pounds per square inch platen pressure
- Adjustments of mold loadings—zero to 400 tons
- Range of mold thickness, 1" minimum to 5" maximum or 2" minimum to 6" maximum

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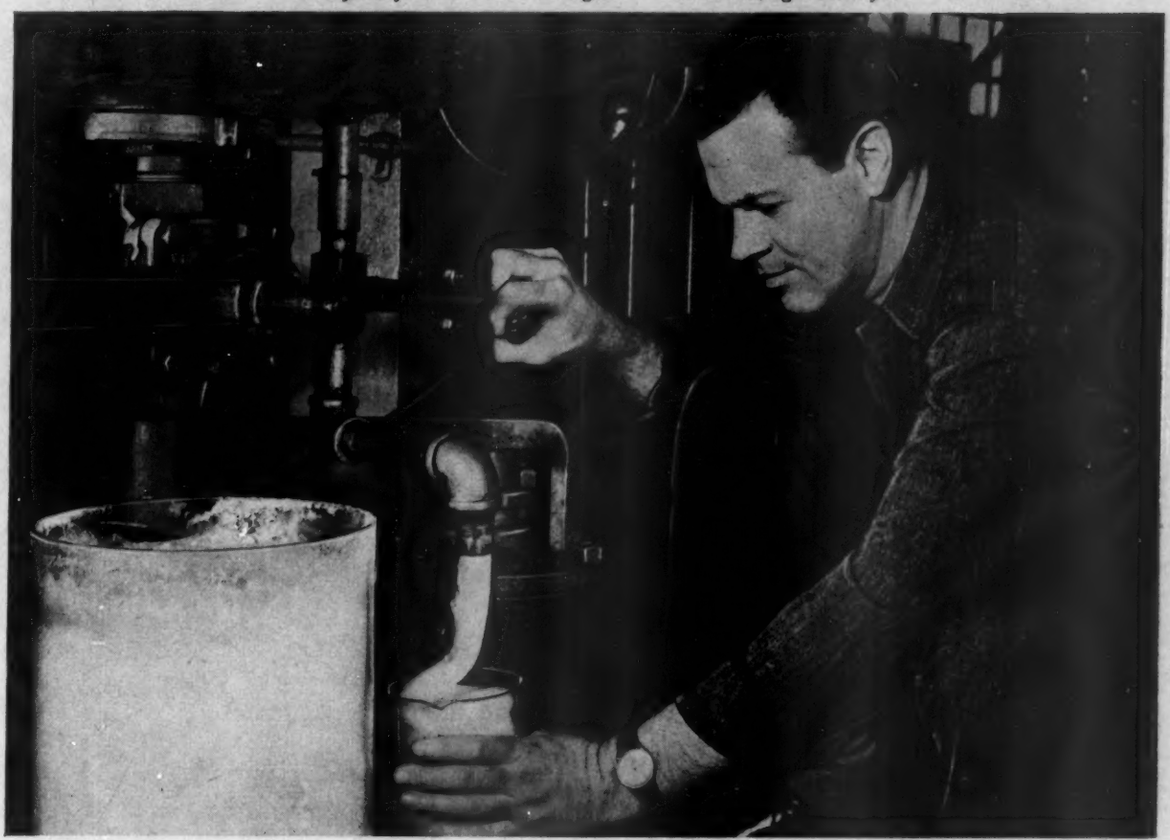
CHEMIGUM — **rubber latices**

PLIOLITE — **resinous latices**

Goodyear synthetic latices have good to excellent storage stability.



Now Goodyear offers you a choice of synthetic latices — either rubber or resinous. One of these materials is certain to fill your needs for an aqueous dispersion. They've been engineered to offer a range of properties to meet a wide grouping of problems. Or these latices can be successfully compounded to meet specific needs as well.

Rubber members of the family are **Chemigum** latices 101A, 101E and 200—used for dipped goods, wire insulation, paper coating and impregnation, fabric coating and sizing, adhesives and water emulsion paint additives.

The resinous latices are **Pliolite** latices 150, 170 and 190—for reinforcing rubber latices, coating papers and fabrics, in sealers for wood composition board and plaster, in water emulsion paints and in adhesives.

For the details on the physical properties and the compounding of these latices write Goodyear, Chemical Division, Akron 16, Ohio.

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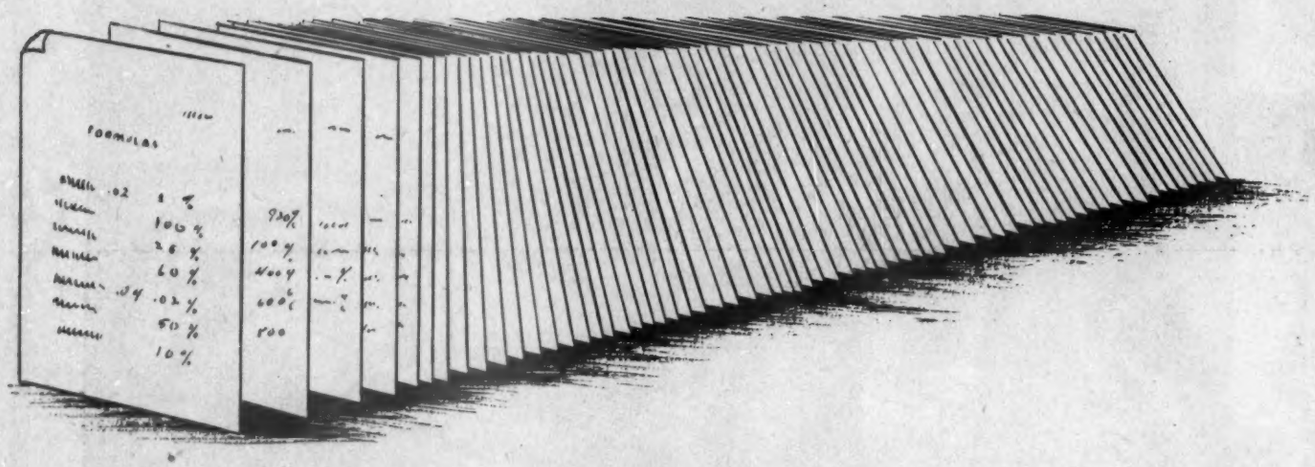
Chemigum, Pliolite—T.M.'s The Goodyear Tire & Rubber Company

We have on file

HUNDREDS OF FORMULAS

USING NATURAL AND GR-S RUBBER



Our formulas were developed to meet the customer's specifications for use in Mechanicals, Cements, Footwear, Soles and Heels, Insulated Wire, and others too numerous to mention.

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The many excellent properties of this quality pigment, such as easy dispersion . . . exceptional light resistance, even in low concentrations . . . freedom from crocking, migration and bleeding . . . can give you profitable results in the production of fine plastic products.

Green-Gold combines with "Monastral" Green to make brilliant, lightfast green shades. And alone, or in combination with "Monastral," Green-Gold can be metallized with flake aluminum to provide striking "two-tone" effects.

For further information on Green-Gold and other Du Pont pigments for rubber and plastics, ask your Du Pont salesman—or write: E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, 1007 Market Street, Wilmington 98, Delaware.

• Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC coast to coast

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RCMA Latex and Latex Concentrates are produced in Sumatra, Netherlands East Indies, and as in prewar days they are known for their excellence. RCMA Latex is prepared under expert technical supervision and uniform quality is assured by a steady flow of latex from the large plantations owned and operated by N. V. Rubber Cultuur Maatschappij "Amsterdam".

RCMA 61-63% Centrifuged Latex is now available for shipment in tank cars, tank trucks and drums.

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"G" RESIN

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465 RESINS

Colors

From pale amber to dark brown

Melting Point

5° to 160° C

Uses

In the production of adhesives, electrical insulation, concrete curing compounds and chewing gum.

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Write for information on their uses in your products!

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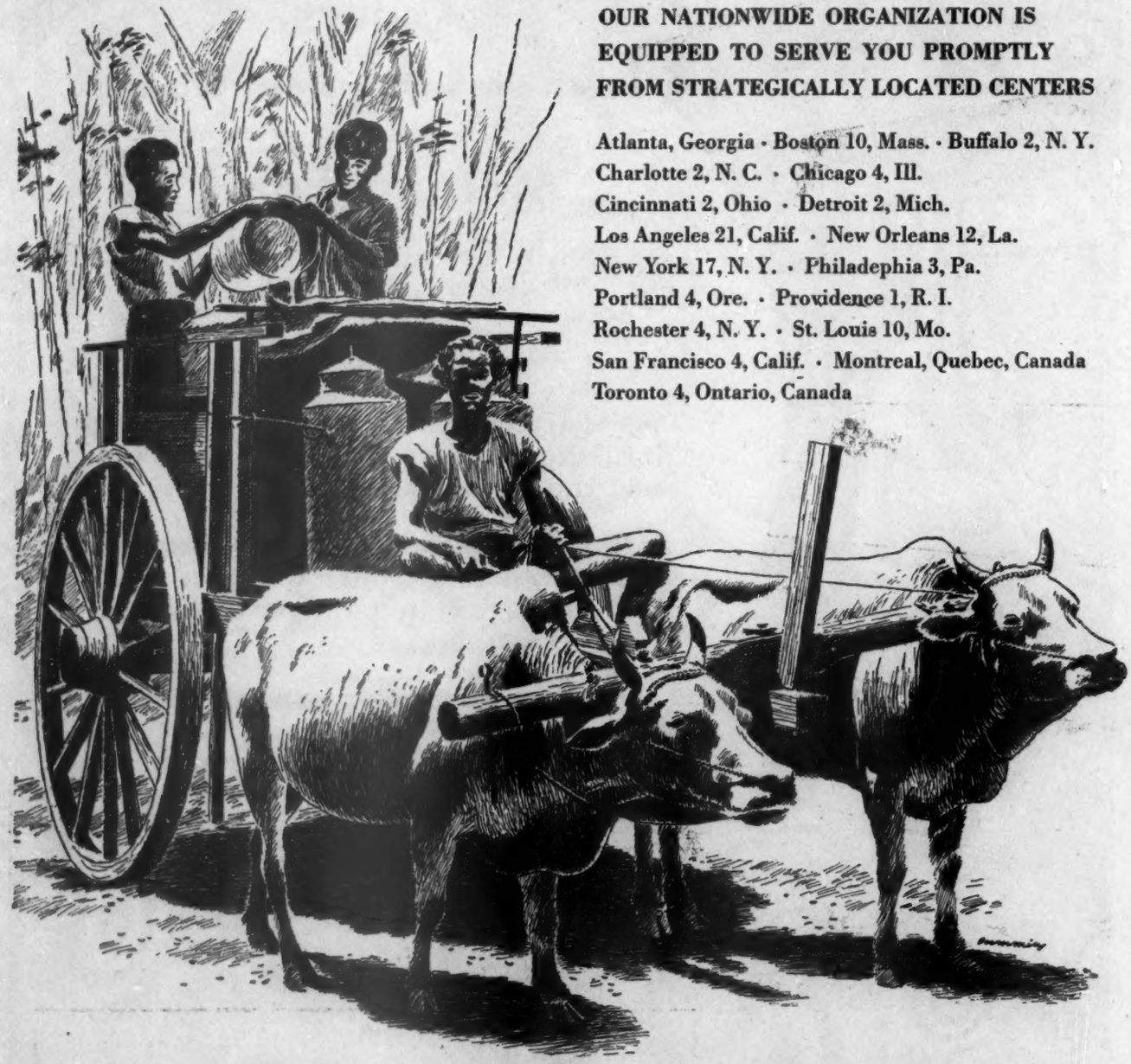
Crude rubber and natural latex



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STEIN HALL

285 MADISON AVENUE NEW YORK 17, N. Y.

EST. 1866

PEPTON* 22 Plasticizer can be added at the PLANTATION or IN THE MILL

First shipment of natural rubber containing PEPTON 22 from Teluk Merbau Plantations is unloaded at a New York dock. The PEPTON 22 was incorporated in the latex prior to coagulation.

PEPTON 22 Plasticizer, a free-flowing powder, can now be incorporated into latex at the plantation...or it can be added to natural rubber or GR-S during the milling process. In either case, it acts as an efficient peptizer or catalytic plasticizer.

PEPTON 22 cuts breakdown time at least 50% and reduces power consumption. It improves processing qualities and has no effect on the physical or aging characteristics of the rubber.

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION

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BOUND BROOK, NEW JERSEY

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Gives Your Products

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BEACOFINISH—a unique family of coating materials conceived to give your products greater durability and eye appeal. These highly concentrated wax emulsions that can be diluted with up to four parts of water can be used with the utmost safety and economy.

BEACOFINISH is therefore of four-fold importance to you:—

1. ***It Protects*** your products against their natural enemies—air, sunlight, moisture and excessive handling.
2. ***It Improves*** the appearance of your product for its uniform coating stimulates greater consumer interest.
3. ***It's Economical*** because its high dilution potential (without losing efficiency) allows one gallon to cover 15,000 sq. ft.
4. ***It's Safe*** being a wax in water emulsion, it eliminates the fire and health hazards of volatile-solvent based finishes.

BEACOFINISH can be applied by dipping, sponging, spraying or brushing—dries in about 20 minutes—faster if force-dried—to give a hard protective coating of great elasticity.

BEACOFINISH may be ordered in Neutral or Black, in varying degrees of luster from brilliant to dull. It is so concentrated, from one drum you can obtain potentially up to five drums of superior coating for your products.

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ALBALITH-73

(LITHOPONE)

Imparts High Resilience

Albalith-73, a special surface-treated lithopone, provides superior resilience characteristics, together with high tensiles and tear resistance.

The pendulum rebound and heat generation properties of Albalith-73 are slightly better (as shown below) than those of the higher reinforcing Protox-166 Zinc Oxide* at an equal volume loading.

TABLE OF DATA

Time of Cure Min. at 30 Lb.	Goodyear-Healey Pendulum			Compression Fatigue (Goodrich Flexometer)**				
	Indentation in mm.	Per Cent Rebound	Shore Hardness	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression Initial	Dynamic Compression Final
ALBALITH-73								
60	9.38	85.2	46	20.8	15'-1.8	7.0	6.1	6.1
PROTOX-166 ZINC OXIDE								
60	8.97	83.7	49	20.0	15'-2.3	9.0	5.7	5.7

**Test Conditions: 93 Lb. Load; 0.25" Stroke; 100°C. Oven Temp.

MAY WE SEND YOU samples of Albalith-73, and Technical Bulletins describing the properties and applications of this special lithopone?

COMPOUND

Smoked sheet	100
Sulfur	3
MBT	1
Agerite Powder	1
Stearic Acid	3
Protox-166	100— 5
Albalith-73	0—70.4

**U.S. Patents 2,303,329 and 2,303,330*

HIGHLIGHTS of ALBALITH-73

1. **Aids processing**
   - Easy incorporation
   - Helps tubing, calendering and spreading
2. **Good reinforcement**
   - High tensiles
   - Good tear resistance
3. **High resilience**
   - High rebound
   - Low heat generation

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC COMPANY

Founded 1848

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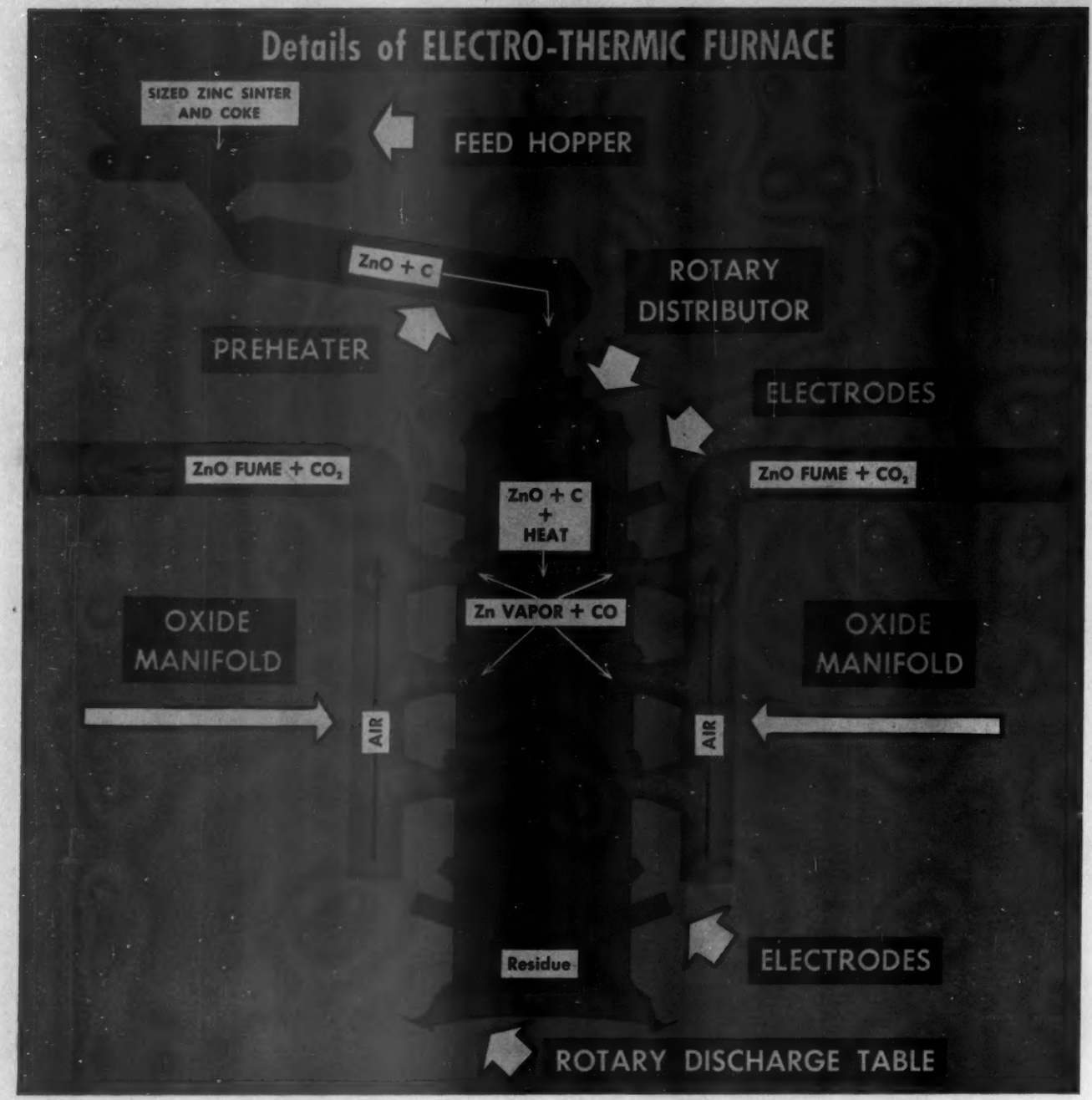

ST. JOE Lead-Free ZINC OXIDE

Made by the improved American Process

The St. Joe Electro-Thermic method of smelting zinc ore is a recent improvement of the American Process, and the diagram shown here illustrates the final operation in the production of zinc oxide.

Prior to this operation the mined ore has been concentrated, calcined and sintered to remove impurities, some of which, such as sulfur, cadmium and lead are recovered. Sized zinc sinter and coke are transferred from the feed hopper to the preheater, where they are thoroughly mixed and brought near to smelting temperature, and are thence distributed evenly in the furnace by the rotary feed mechanism, which also excludes air from the furnace interior. The furnace charge is brought to smelting temperature by its action as resistor to a 3-phase electrical current supplied by six carbon electrodes which are inserted in the charge. At this temperature, carbon combines with the oxygen, held by the zinc in the sinter, releasing carbon monoxide and zinc vapor which are forced through tuyeres as a result of a slight pressure created in the furnace. Air is introduced at this point and the zinc vapor and carbon monoxide are oxidized under carefully controlled conditions to zinc oxide fume and carbon dioxide, which are then conducted through the pipe line, together with excess air, to the bag room where the zinc oxide is filtered from the carrying gases, collected and packed for storage.

The direct-from-ore, or American Process, is more economical than the two-step, or French Process. By the latter, metallic zinc is produced first and, by the second step, is converted into zinc oxide. The American Process also makes it possible to produce types of zinc oxide that give superior properties to the product in which it is used as a raw material.

ST. JOSEPH LEAD COMPANY
250 PARK AVE., N. Y. 17 • Eldorado 5-3200
Plant & Laboratory, Monaca (Josephtown) Pa.

SANTICIZER 160

Low-cost PLASTICIZER now available in quantity

Santicizer 160 is now available at reduced prices—for immediate shipment in any quantity. Since it is less expensive than any other plasticizer of comparable quality, Santicizer 160 will help you reduce compounding costs, yet maintain excellent performance characteristics.

Santicizer 160 combines many plasticizing advantages . . . It makes possible economical reductions in processing temperatures for vinyl films, sheetings, extrusions, and floor tiles — lowers burning rates of these materials.

Monsanto's basic position on raw materials assures a steady supply of highest quality plasticizers. Consult Monsanto technicians . . . They are especially qualified to assist you on any problems in this field.

For complete information and samples of Santicizer 160, contact any District Sales Office, or write MONSANTO CHEMICAL COMPANY, Desk E, Organic Chemicals Division, 1708 South Second Street, St. Louis 4, Missouri. Ask also for a copy of "Monsanto Plasticizers," a new, comprehensive treatise on plasticizing action, applications and performance results of Monsanto plasticizers.

Santicizer: Reg. U. S. Pat. Off.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

ADVANTAGES OF SANTICIZER 160

1. **Low Cost (recent reduction makes it lowest-priced plasticizer of comparable quality).**
2. **Excellent Processing Action (enables lower calendering temperature or faster rates of operation).**
3. **High Tear Strength.**
4. **Low Burning Rate (less flammable than most phthalate-type plasticizers).**
5. **High Tensile Strength.**
6. **Readily Available in Quantity.**

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CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY
Desk E, Organic Chemicals Division
1708 South Second Street, St. Louis 4, Missouri

Please send me: ☐ complete information, ☐ samples of Santicizer 160; ☐ a copy of "Monsanto Plasticizers."

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Company_____

Address_____

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RECIPE

(Test No. 8421 from the Barrett Rubber Research Laboratory)

FOR

CUMAR*

RESIN, MH 2½ GRADE IN A Natural Rubber, Non-Tarnishing Black Gasket Compound

CUMAR* resin, MH 2½ grade, is well adapted for use in compounds that will not cause tarnishing when used in contact with silvered surfaces such as reflectors of headlamps and spotlights. Its behavior as an effective softener and extender for natural rubber recommends its application on the basis of economy as well as quality and performance. For smooth and safe processibility, for the retention of physical properties, and for essentially non-staining and non-migrating purposes, CUMAR* resin, MH 2½ grade, is well qualified to assist the compounder in the design of recipes for general and specific applications.

Compound No. 8421—LTO

Smoked Sheets	100.0
CUMAR* Resin, MH 2½ grade	10.0
Calcium Carbonate (Precipitated)	100.0
Furnace Black (HMF)	10.0
"DIXIE" Clay	40.0
Zinc Oxide	5.0
Stearic Acid	2.0
"B-L-E" 25	1.0
"SUNPROOF"	1.0
Sulfur	0.1
Ethyl "SELENAC"	1.0
Mercaptobenzothiazole	0.5
	Total 270.6
Specific Gravity	1.49
RHC, % by weight	37.0
RHC, % by volume	59.6
Mooney Viscosity, ML, 212 F. at 4 minutes	26

Mooney Scorch, MS, 220 F.:

Minutes	Viscosity
1	16
10	15
20	15

Press Cure at 316 F. (70 lb.)—10 Minutes	Unaged	Aged 70 Hours at 70 C.
Tension and Hardness Data:		
Stress at 300%, psi.	700	1000
Stress at 500%, psi.	1600	1950
Tensile, psi.	1900	2100
Elongation, %	550	510
Hardness, Shore A	55	60
Tear Resistance, Angle, Pounds per One Inch Thickness	90	105
Compression Set†, 40% Constant Deflection, %	29.3	—
Resilience, †(Yerzley), % Energy Recovery	43.4	53.3
Impact Resilience †(G-H), % Rebound	47.8	52.5

†Specimens cured 15 minutes at 316 F. (70 lb.)

Barrett*

*Reg. U. S. Pat. Off.

THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, P. Q.

For:

Adhesives
Rubber goods
Mastics
Paper products
Tape

Available in seven grades

Brand Name	Indopol L-100	Indopol H-35	Indopol H-100	Indopol H-300
Mean molecular wt. . .	470	660	780	940
Viscosity 100° F., Saybolt sec.	1040	9200		
Viscosity 210° F., Saybolt sec.	93.8	377	1040	3000
Specific gravity 60°/60° F.	.854	.871	.881	.894
Refractive Index, $n_{20/D}$	1.4759	1.4858	1.4918	1.4959
Color, NPA.	2	2	2	3
Pour Point (ASTM) °F..	—25	0	20	35
Weight, lbs./U. S. gal..	7.11	7.25	7.34	7.44

Additional grades, and their Saybolt viscosities at 210° F., are L-10 (40.6 sec.), L-50 (68.2 sec.) and H-50 (540 sec.).

INDOIL CHEMICAL COMPANY
910 SO. MICHIGAN AVE. • CHICAGO 80, ILLINOIS

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CHEMICAL PRODUCTS

How to make a *Stronger bond* between rubber and fabric

MORE STRENGTH HERE. Pre-treatment of the tire fabric with Resorcinol Adhesives in the latex mixture assures a stronger bond between the fabric and the tread.

TIRES, belting and other products which include laminations of rubber and fabric or cords are serviceable only as long as the parts hold together. To obtain best adhesion of rubber to fabric or cords, it is common practice to pre-treat the fabric in a mixture of rubber latex and some adhesive material. For this purpose adhesives prepared with Koppers Resorcinol are proving highly successful.

Recent tests have shown that Koppers Resorcinol Adhesives used in the pre-dip treatment produce a much stronger bond than casein. This is true with cotton, rayon and nylon fabrics but the most marked improvement is shown on the rayon and nylon.

You can prove this for yourself in your own laboratories. Write for a sample of Koppers Resorcinol and a copy of our Technical Bulletin.

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KOPPERS COMPANY, INC.

Chemical Division

Pittsburgh 19, Pa.

The consistent, dependable uniformity of Cabot carbon blacks is the result of manufacturing experience and continuous research by the Cabot company since 1882.

Spheron 9 is one of the blacks developed more than ten years ago by Cabot for the rubber industry. This channel black with its invariable easy processing properties is one of many that have made the name Cabot synonymous with uniform quality carbon blacks.

Spheron

EPC* 9

CABOT

GODFREY L. CABOT, INC., Boston 10, Mass.

*

WITCO SUNOLITE

anti-sun checking wax

. . . GIVES BETTER AGE RESISTANT PROPERTIES TO NATURAL AND SYNTHETIC RUBBER COMPOUNDS

Exposure and ozone tests of stocks compounded from natural and synthetic rubbers containing WITCO SUNOLITE compared with other anti-sunchecking agents show that as an inhibitor of static atmosphere and corona cracking SUNOLITE's weather-resisting properties are *outstanding*.

In fact, 18 months' exposure of a GR-S stock proves SUNOLITE to be 100% effective!

Lighter in color, WITCO SUNOLITE can be used in white or pastel stocks without adversely affecting the shade. And SUNOLITE is easily and quickly incorporated into a rubber mix.

Get complete information about WITCO SUNOLITE and what it can do Write today for WITCO TECHNICAL SERVICE REPORT R-7 which gives all properties of SUNOLITE and the results of tests that prove the superiority of this outstanding product.

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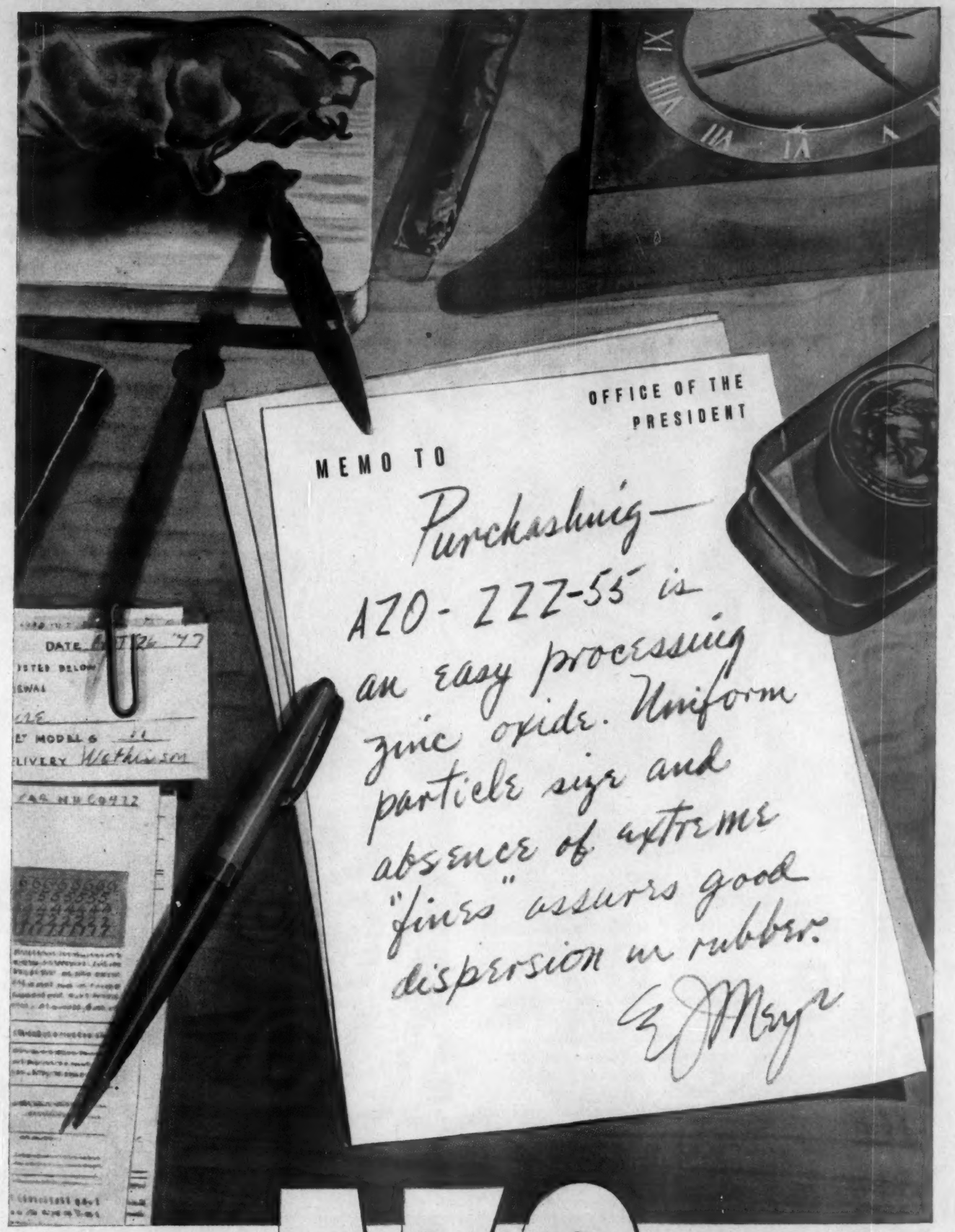

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AMERICAN ZINC SALES CO.

Distributors for

AMERICAN ZINC, LEAD & SMELTING CO.

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HERE'S WHY

A new National Tuber will cut your production costs!

OUTMODED tubers and resulting high-cost production can spell LOSS on your statement, in capital letters.

Never was it more important to replace high-cost, inefficient units with modern *National* tubing equipment.

Production costs are lowered through a more effective use of power, closer control of stock dimensions and lower working temperatures.

A comprehensive bulletin covering the many outstanding features of NRM tubing machines in models ranging from 2″ to 12″ screw diameters, is available now. Write for it—today.

COMPARE THESE NRM FEATURES

1. **CYLINDER HEADS** *in all production sizes, available with adapters for water cooling.*
2. **PYRO-HARDENED SCREWS** *of selected forged steel insure maximum durability, minimum wear.*
3. **HEAVY CAST IRON CYLINDERS,** *water jacketed, with removable spiral sleeve equipped with Xaloy bushing.*
4. **HOPPERS,** *conveniently designed for manual or mechanical feeding.*
5. **MANIFOLDS** *are built in and equipped with four valves for heating or cooling cylinder.*
6. **STRESS RODS** *are extra heavy to insure perfect alignment of head and cylinder with gear housing. Precludes breakage.*
7. **THRUST BEARINGS** *are anti-friction type. Oversize throughout for added strength.*
8. **DRIVE GEAR UNITS** *employ case hardened steel herringbone gears. All shafts mounted in heavy duty roller bearings. Sealed, oil tight housing joints . . . self-lubricating system.*

NATIONAL RUBBER MACHINERY CO.
General Offices: AKRON 8, OHIO

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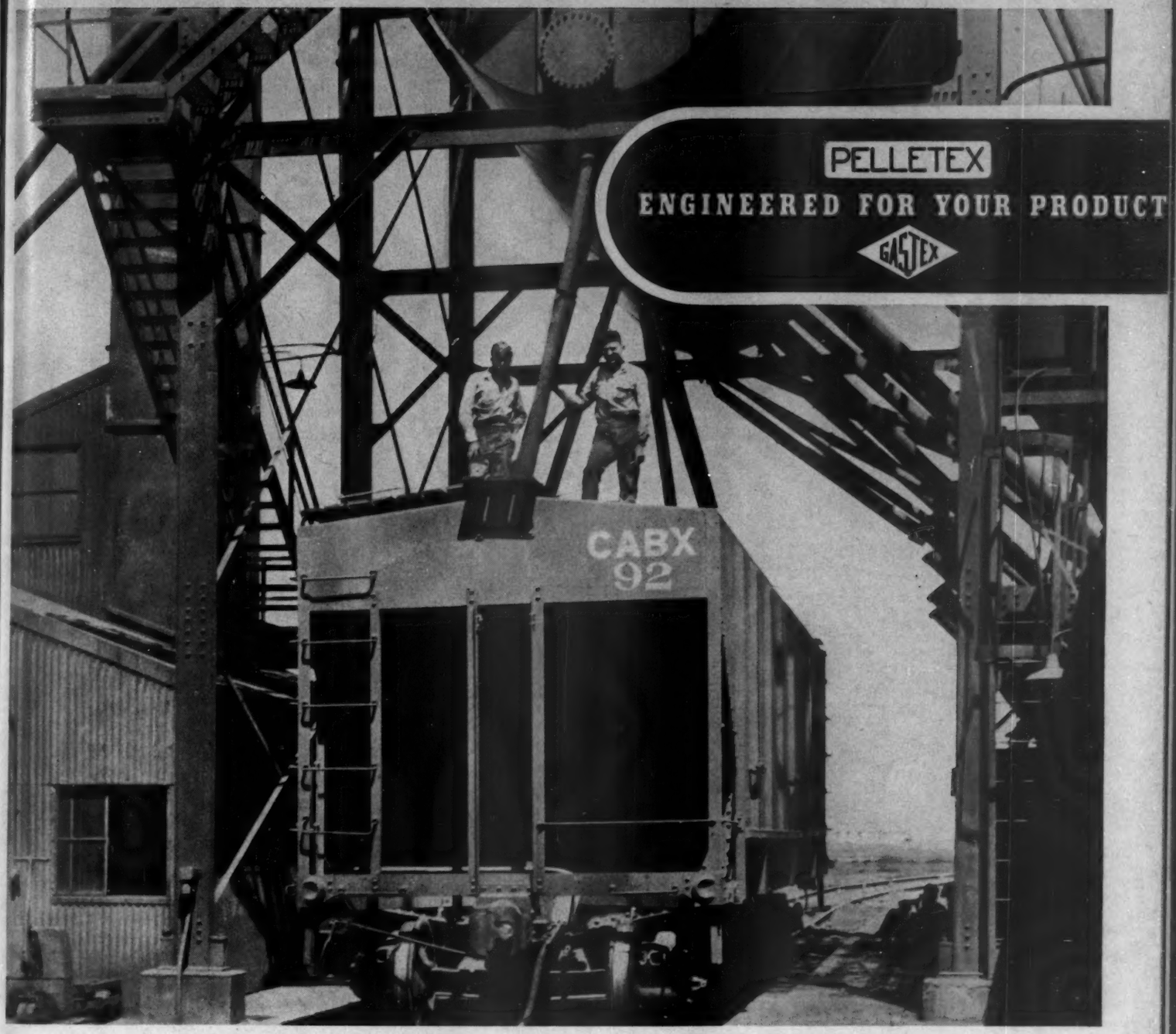

PELLETEX *shipped in bulk for your convenience*

General Atlas SRF carbon black being loaded into specially designed covered hopper cars for bulk shipment to rubber factories. Pelletex shipped in bulk or bags, by rail or road, always maintains the uniform high quality for which it is famous.

CABOT

The GENERAL ATLAS Carbon Co.

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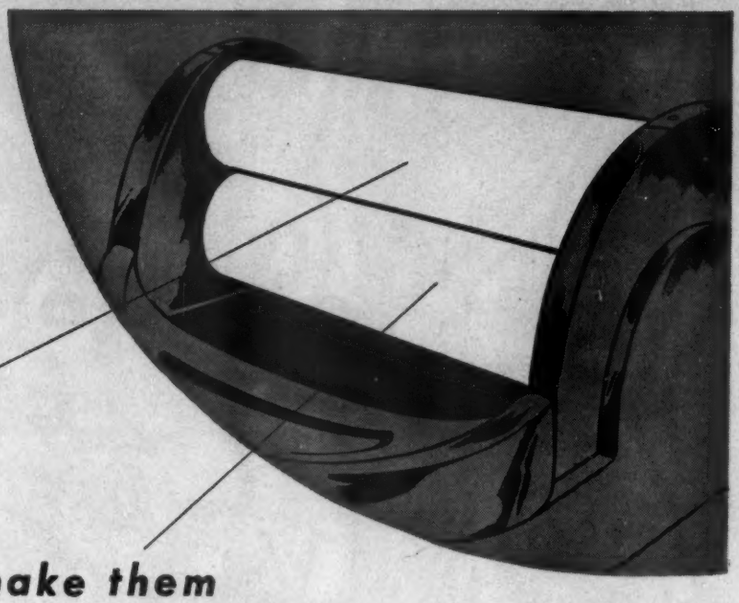
The B. E. Dougherty Company, Los Angeles and San Francisco • Delacour-Gorrie Limited, Toronto



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Manufacturers of wringer rolls find that balanced compounding to secure proper hardness, compression, and resilience in the roll naturally calls for TITANOX-RCHT, which also contributes brightness and whiteness economically.

There is a specific grade of TITANOX pigment that best meets your needs for whitening or tinting, brightening or opacifying your rubber stocks. Call on our Technical Service Laboratory to help solve any pigmentation problem. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities.

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Heavy-duty Mills, in all sizes up to 84 inches, featuring extra heavy construction, smooth operation, and long life.

Laboratory Mills furnished with built-in motor, control and adjustable speed drive. Entirely enclosed ready to operate. Mechanism is readily accessible.

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42—ton Laboratory Presses, entirely self-contained, equipped with 12"x12" platens, occupying floor space of only 14"x26". Hot adjustable opening.

Presses for compression, transfer molding, laminating, and polishing. All sizes and types. Custom built.

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- PRESSES
- CRACKERS
- WASHERS
- CALENDERS
- REFINERS

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RUBBER AND PLASTICS MACHINERY DIVISION

These machines can all be furnished as

Matched production units are machines which are *matched in capacity* and *synchronized in speed* to assure free-flowing production without costly interruptions caused by the "choking" or "starving" of some of the units.

We have developed equipment—such as Banbury mixers, mills, calenders and extruders—in a wide range of sizes. This enables us to engineer a complete production layout in which all machines work full time, at capacity.

Another advantage of such an engineered layout is the reduction in the manual aid and supervision required. In some cases an individual machine will require no operator at all.

Before you purchase new processing equipment, why not look into the advantages of *matched production units?* One of our engineers will be glad to discuss your processing problems with you at any time.

1. BANBURY MIXERS are made in eight standard sizes, from the size B for laboratory or small production work to the huge No. 27 with its net chamber capacity of 37,709 cubic inches. With such a range of machines to choose from, you can select the mixer that will provide the production you require.

2. MILLS are built in a complete range of standard sizes, from 6" x 13" for the laboratory up to 28" x 84" heavy duty mills for the factory. For particular requirements, special sizes and variations in design, as well as a wide choice of drive arrangements, are obtainable, often from existing plans.

3. CALENDERS are made in a wide range of types and sizes with any number and arrangement of rolls. From the small laboratory units to the huge production sizes, the physical proportions, materials, type of construction, lubricating system, gearing, special operating features —in fact, every detail is designed to fit the job the calender is built to do.

4. EXTRUDERS are available in a number of different sizes and types. Tubing and straining machines, with the exclusive roller feed which increases output and produces stock of greater density and uniformity, are built in 6", 8", 8½", 10" and 12" sizes. Other types of extruding machines, having a variety of applications are made in a range of sizes from 3" to 20".

5. GORDON PLASTICATORS, in 12", 15" and 20" sizes, are designed for breaking down rubber. They soften the stock by mechanical action so that it may be more readily worked and mixed with compounding ingredients in subsequent operations.

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F-B PRODUCTION UNITS

- Banbury Mixers
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- Pelletizers
- Mixing, Grinding, Warming and Sheeting Mills
- Bale Cutters
- Tubing Machines
- Refiners
- Crackers
- Washers
- Calenders
- Hose Machines
- Hydraulic Presses
- And Other Equipment for Processing Rubber and Plastic Materials

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Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
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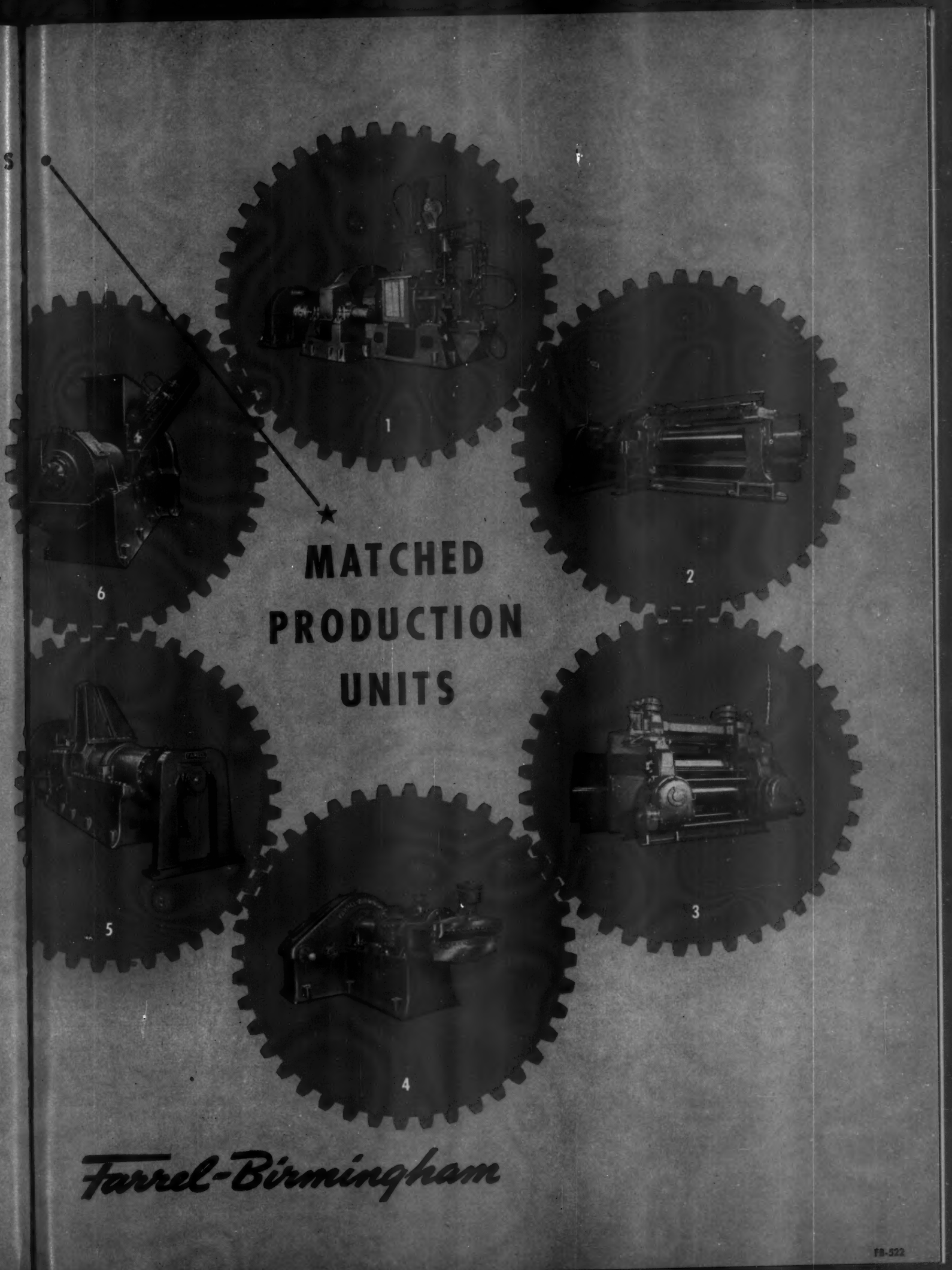
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UNITS
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Farrel-Birmingham
FB-522

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WHICH ONE WILL HE SELL?

The tiles look alike, but the salesman has an extra story in the one that's MULTIFEX made—it's *scratch-resistant.*

MULTIFEX, produced in three grades by DIAMOND ALKALI, is a precipitated calcium carbonate specifically designed to improve the appearance of plastics and rubber goods.

When used with plastics, MULTIFEX lends increased strength and improved light stability as well as scratch resistance.

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The three grades, MULTIFEX, SUPER MULTIFEX and MULTIFEX MM, vary in particle size (from .03 to .06 microns) and in other desirable physical characteristics. We'll be glad to help you select the one best fitted to your needs. Just get in touch with our nearest sales office or distributor.

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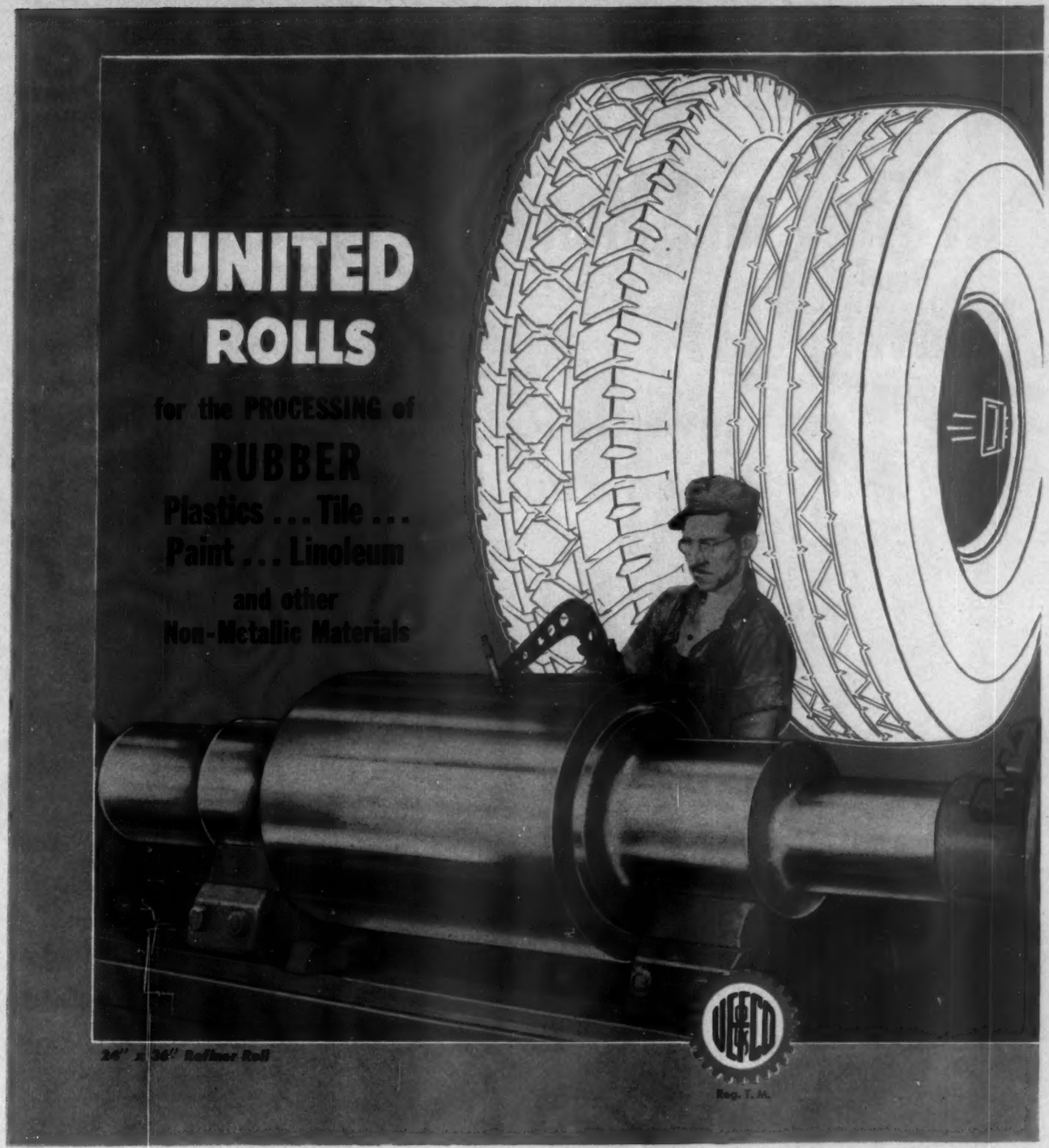

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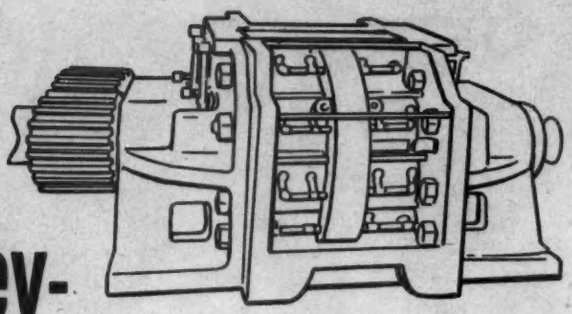

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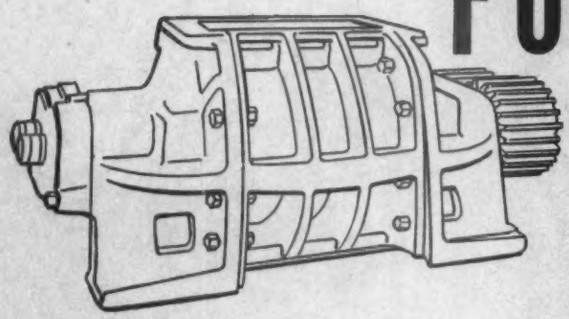

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KOSMOS 20—An SRF type carbon black, possesses perfect balancing of all component properties essential to satisfactory rubber performance; outstanding for ease of processing, good plasticity, fast rate of cure, high resiliency, and low heat build-up.

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KOSMOS 40—An HMF type carbon black with these properties—cool mixing, smooth and rapid extrusion, fast rate of cure, high resistance to cut-growth, flex cracking and abrasion. Produced by a special process. This furnace type black is especially useful for tires, tubes, footwear, and mechanical goods.

KOSMOS 50

KOSMOS 50—An HMF oil base furnace black specially developed as a processing aid for channel black, inducing smooth, fast and clean cut extrusion, low and even shrinkage, and its stocks have clean edges and no surface roughness. KOSMOS 50 requires no added acceleration at increased black loadings and gives higher reinforcement at lower loadings, is economical for stock where extreme resistance to abrasion is not mandatory.

KOSMOS 60

KOSMOS 60—An RF oil base furnace black, specially developed to deliver remarkably high reinforcement and superior resistance to abrasion and to flex crack cut-growth. KOSMOS 60 is a guide to rapid, smooth extrusion and low shrinkage, and requires no added acceleration at increased black loadings. KOSMOS 60 provides high electrical conductivity.

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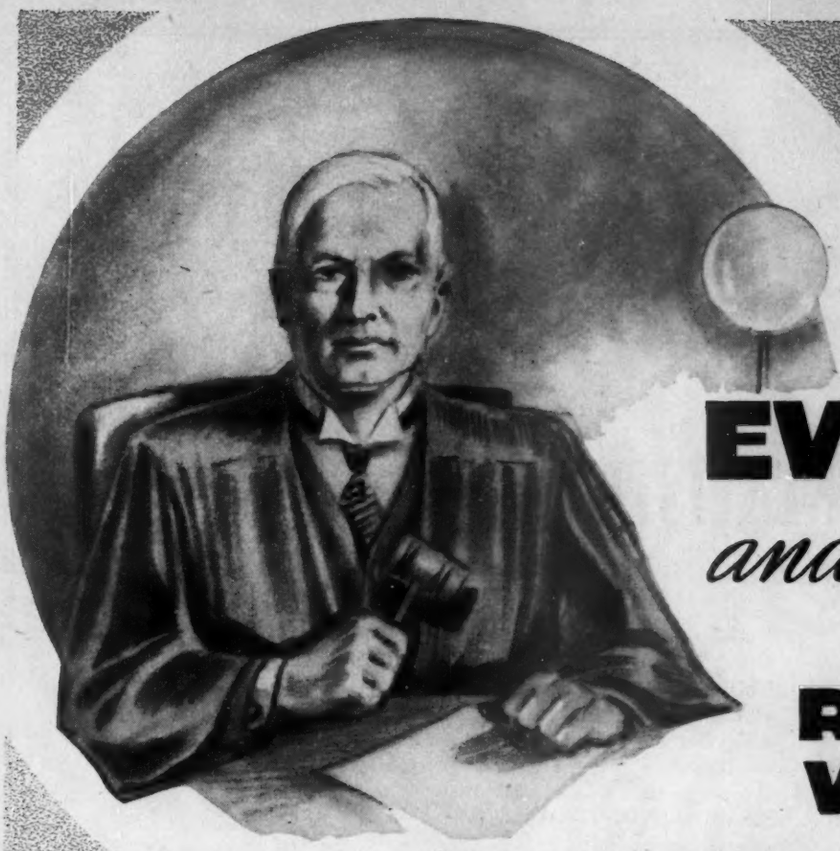

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WILL DO FOR YOU

Investigate these **FACTS**

Prevents adhesion of hot rubber slabs when piled . . . banishes dust nuisance by replacing soapstone or talc . . . prevents sticking during cure of extrusions and flat pan coiled tubing . . . excellent release agent for molds, mandrels, air bags, belt drums . . . equally satisfactory for washing and finishing inner tubes; imparts satiny finish . . . greatly aids in the processing of insulated wire and cable. The Production Departments and Laboratories of many rubber manufacturers, through years of using GLYCERIZED, give ample proof of its outstanding qualities as a lubricant for natural, synthetic and reclaimed stocks. Write for sample on your letterhead, then evaluate. You are the judge of the results.

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Each issue of the BULLETIN is replete with up-to-the-minute world-wide data on the production, exports, imports, consumption and stocks of rubber. Over 55 separate tables are used to enable the user to locate specific information on any phase of the rubber picture. Each issue is divided into 8 separate sections, as follows: Natural Rubber, Natural Latex, Synthetic Rubber, Synthetic Latices, Natural and Synthetic Rubber, Reclaimed Rubber, Rubber Manufactures, and General.

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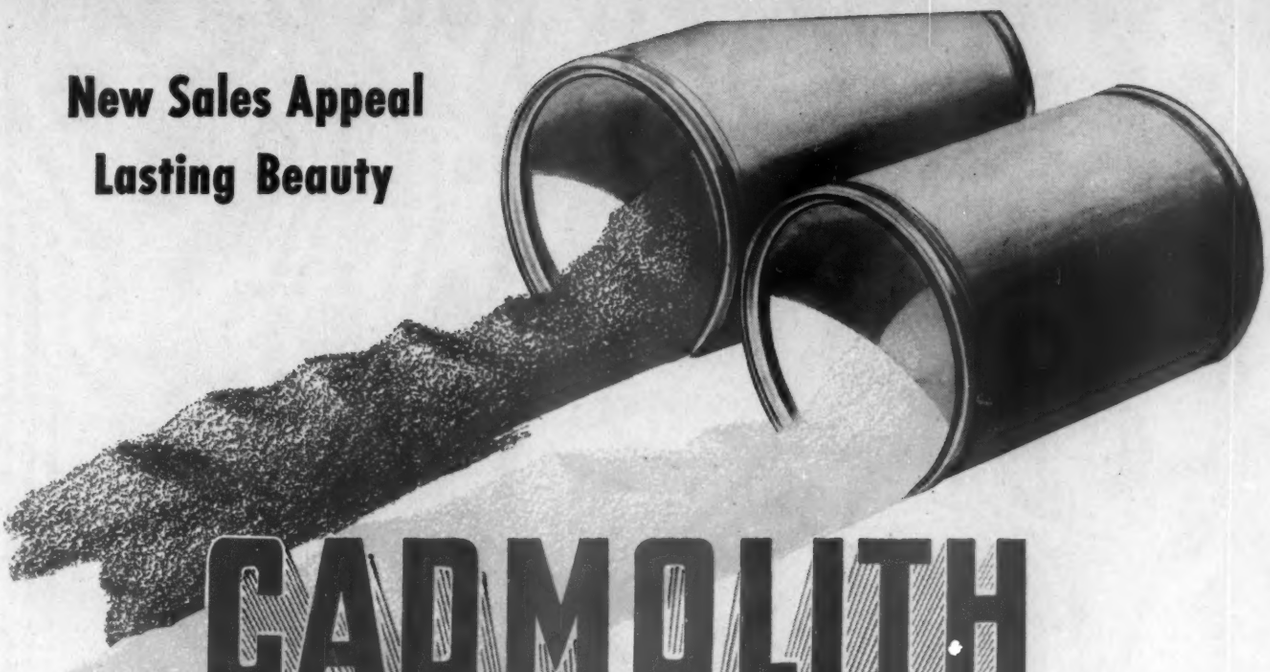

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- Acid resistant
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With a combination of advantages found in no other red or yellow pigments—the direct result of Glidden leadership in research—Glidden Cadmolith* Colors are now adding new sales appeal and lasting beauty to an amazing variety of products. All shades available for prompt shipment.

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ASTROLITH* Lithopone
ZOPAQUE* Titanium Dioxide
CADMOLITH* Cadmium Red and Yellow Lithopone

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MECHANICAL GOODS
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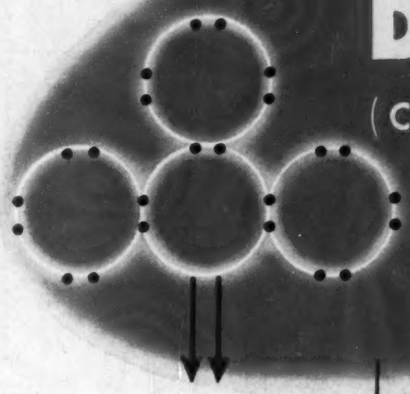
For Industry from *Baker & Adamson*

Boron Fluoride

(COMPRESSED GAS)



The Reason Why BF_3 Is Such A Reactive Catalyst

Boron has three valency electrons which it shares with three electrons from the fluorine atoms. Thus, there are only six shared electrons of eight needed to complete the boron octet. Consequently boron trifluoride is highly reactive, forming complexes with a large number of materials, these complexes serving as intermediates in numerous catalytic processes.

Other BF_3 compounds commercially available include—
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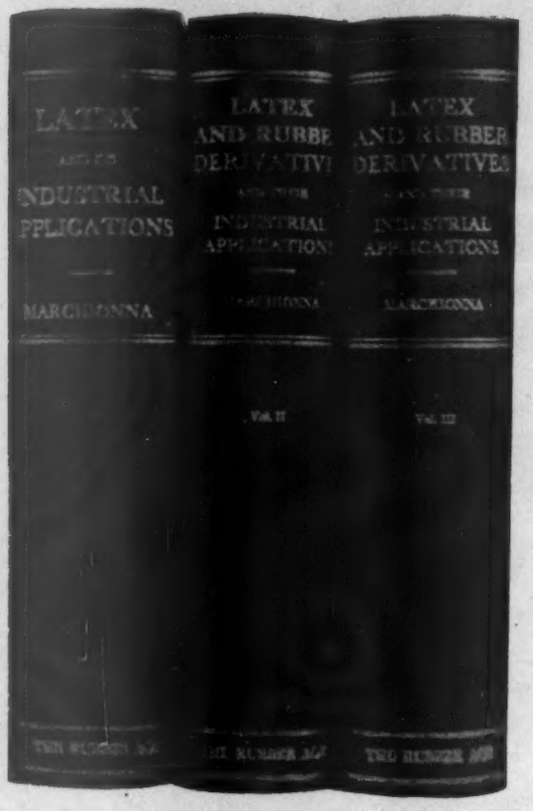

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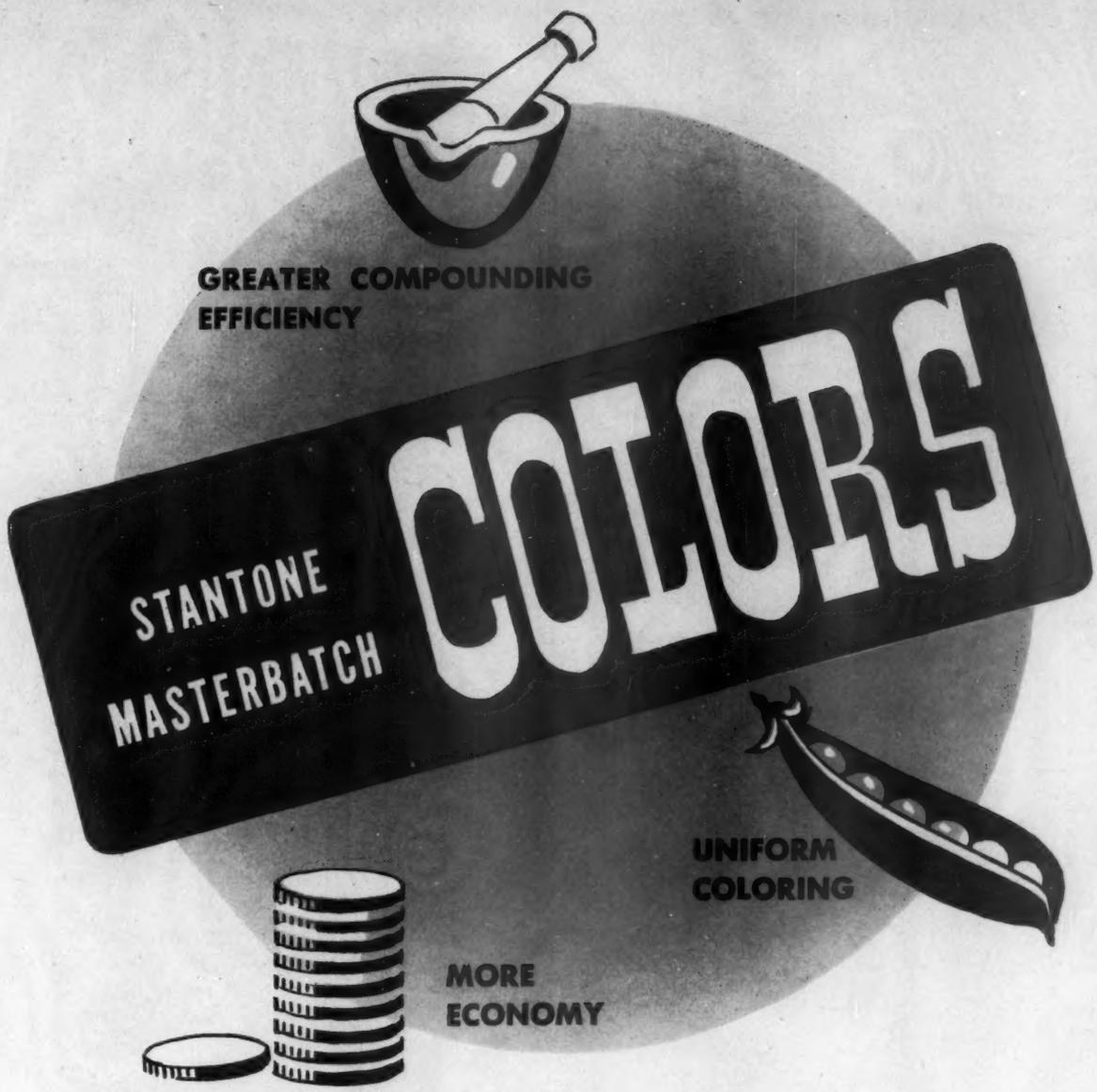

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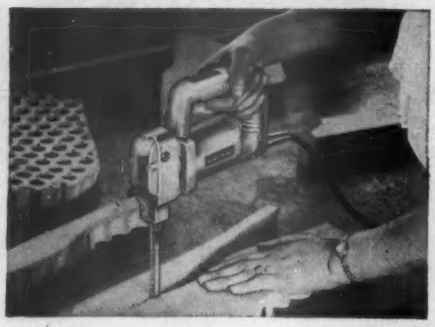

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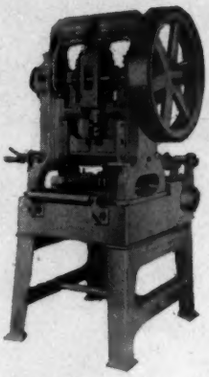

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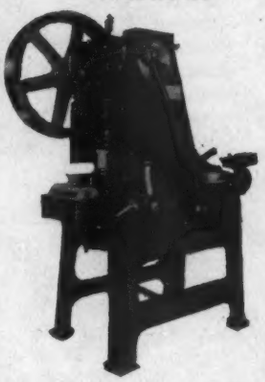

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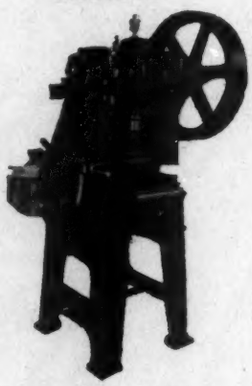

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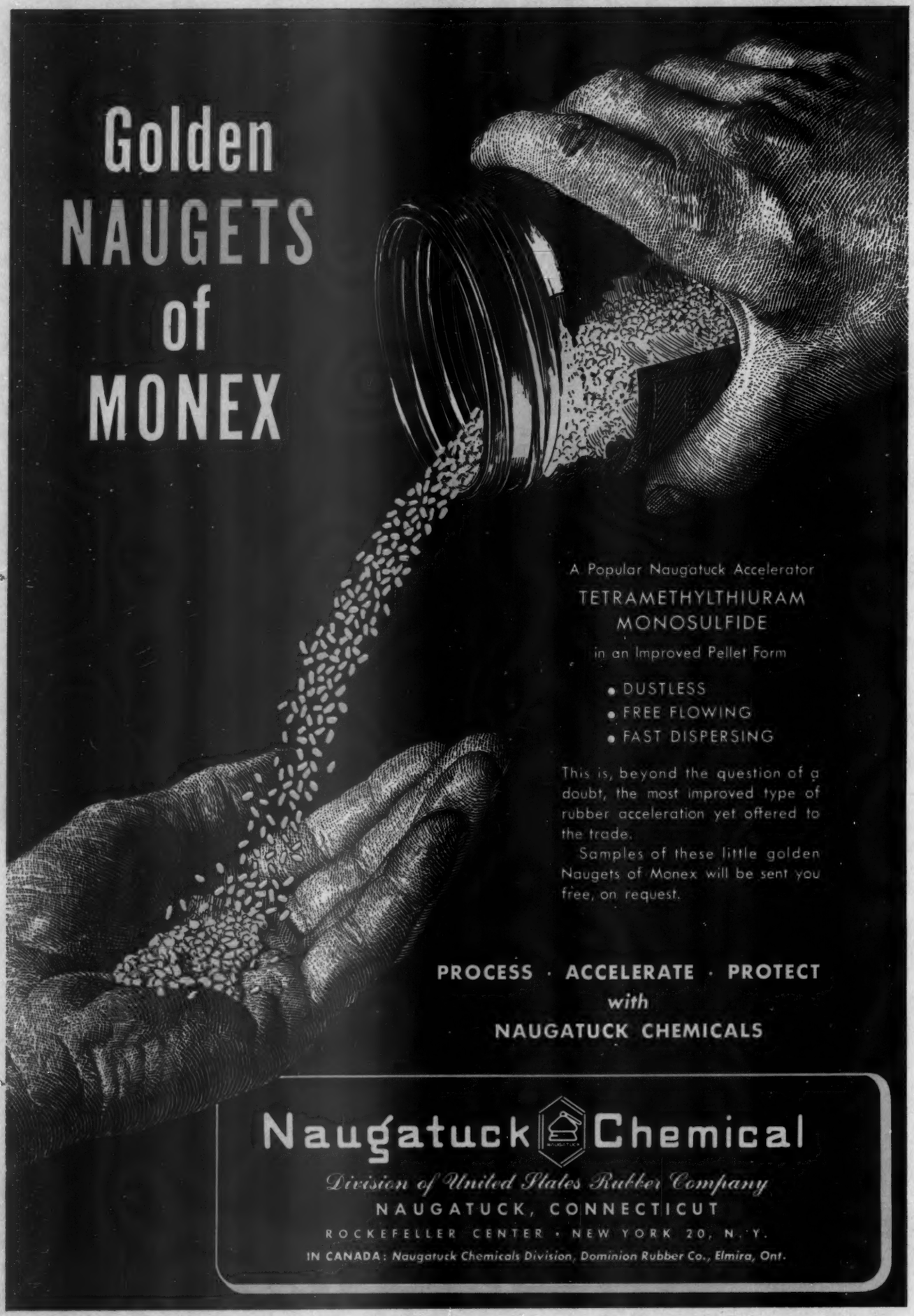

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RUBBER AGE

Vol. 65, No. 2 MAY, 1949

Soft Rubber Bearings

Design Features and Methods of Application to Conditions of Water Lubrication

By A. BEDNAR

Vice-President, Lucian Q. Moffitt, Inc., Akron, Ohio

SOFT rubber compositions, when properly prepared, have shown many outstanding properties as materials for water lubricated bearings. This is true even in a greater degree of some of the rubber-like synthetic compounds developed in recent years. The remarkable ability of these elastic substances to resist abrasion and impact is daily demonstrated by the almost phenomenal performance of modern automobile tires. The low friction characteristics which they possess when wet is also commonly illustrated by the behavior of the tire when it slides and spins on wet car tracks. The illustration is even more impressive when it is remembered that every effort is made in the design of the tire to prevent the sliding.

Bearings made of soft rubber or the rubber-like compounds utilize these properties, and others, to provide important economies and operating efficiencies under conditions of water lubrication. Such bearings have found extensive and continually increasing use since they were first introduced some 25 years ago. This discussion outlines some of the designs and constructions in common use and how they are applied.

The usual services in which the bearings are employed include stern tube and strut bearings of boats and seagoing ships, as well as rudder shaft or pintle bearings on these vessels; guide bearings on hydraulic turbines, where shaft diameters often exceed 30 inches; bearings in deep well turbines and pumps of other classes, such as power plant circulating pumps, dredging pumps and others handling water or other liquids. The bearings have been found to perform exceptionally well on cutter-shafts of hydraulic suction dredges where impact and abrasive conditions are particularly severe. Sand washers, classifiers and agitators used in various industrial processes are other common applications of the rubber bearings. In chemicals which are destructive to ordinary bearing materials, rubber and synthetic rubber offer convenient solution to otherwise difficult bearing problems.

Note: This paper was presented before the Rubber and Plastics Division, American Society of Mechanical Engineers, New York, N. Y., November 30, 1948.

First Design

The first design of rubber bearing to become widely used was made with helical groove for the circulation of the lubricating water. The bearing is illustrated in Figure 1. The groove extends through the entire length of the bearing, as the figure shows, and it was expected that the rotation of the shaft corresponding to the direction of the spiral would assist the flow of water through the bearing. Thus, the relatively high velocity of the lubricant through the bearing would not only serve to keep temperatures low, but would assist in washing out from the bearing, the abrasive particles encountered in its operation.

This bearing performed well at comparatively light loads and under conditions which were not extremely abrasive, but as loads and sizes of bearings were increased, the edge of the spiral groove in contact with

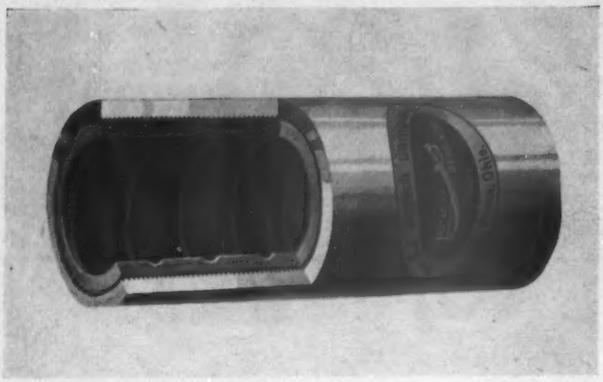


FIG. 1.—First type of water lubricated rubber bearing was provided with spiral groove for circulation of lubricant.

the shaft would tend to wipe the lubricant off of the shaft surface and so prevent proper formation of lubricating film. The length of the spiral groove and its constantly changing direction would not always allow efficient clearing of sediment from the bearing.

Improved Designs

Investigations carried on by the laboratories of the B. F. Goodrich Company, prior to 1930, led to the development of a more efficient type of bearing, a typical cross-section of which is shown in Figure 2. This, as well as the spiral type bearings, are known to the trade as "Cutless."

As will be readily seen from the illustration, this bearing employs a series of longitudinal bearing faces to support the shaft, these faces being separated by water grooves. Uniform cross section of the faces is maintained throughout the entire length of the bearing and the water grooves are completely open at both ends. The rounded profile of the sides of the grooves, particularly at the point of contact with the shaft surface, avoids wiping off of the lubricant as experienced in the helical type groove. The ample multiple groove areas which extend in a straight line along the axis of the shaft assure a good flow of the flushing and lubricating liquids, even when substantial amounts of sediment are carried in suspension.

Flexible Bearing Surface Important

Although the surfaces of the bearing faces in contact with the shaft conform at least in part to the shaft radius, due to the deformation when under load, the bearings are not always shaped to the shaft contour. The faces may be flat before the load is applied, or they may be finished by grinding to the approximate radius of the shaft, depending on method of construction as described more in detail elsewhere in this paper.

Observations in service indicate no essential differences in the performance of the bearings utilizing either of these two types of surfaces. The deformation in each case produces some deflection of the shaft in the direction of the radial load and representative values of these deflections are indicated in the curves shown in Figure 8. The magnitude of the deflection is not sufficient to interfere with the performance of the bearings in the applications in which they are used.

The ability of the rubber and rubber-like materials to deform, is, in fact, an important factor in their successful performance when using water or other low viscosity liquids as lubricants and when operating in abrasive laden liquids. The flexible bearing surface easily adjusts itself to the minute irregularities in the shaft and so permits the comparatively thin film, characteristic of low viscosity lubricants, to be established and maintained.

Experiments conducted by Dr. W. F. Busse and Mr. W. H. Denton, results of which were published in 1932 (*1*), demonstrated that in the range of the usual operating speeds, and apparently above those ranges, there appears to be no increase in the coefficient of friction with increased load, when applied to bearings featuring the multiple face design. This may be clearly seen from the graph indicating effect of load on coefficient of friction, shown in Figure 7. Effect of speed on coefficient of friction is also shown. The behavior of the bearing in this desirable fashion, is, according to the observations of Busse and Denton, due to the ability of the faces to deform so as to adjust the angle of approach between the bearing and shaft to correspond to the varying conditions produced by the increase in load.

The flexible property of the rubber provides another advantage on high speed shafts, in that it permits the shaft to turn on its center of gyration when it does not coincide strictly with its geometric center, thus reducing vibration and stresses in the bearings and supporting structure. Similarly, the deformation of the rubber helps to reduce stresses in cases of certain degrees of misalignment, which are frequently encountered on long shaft installations.

The elastic quality of the bearing surface is of great importance when abrasive particles enter between it and the shaft. Study of bearings which have been in use under such conditions, shows that sand and grit particles do not imbed themselves in the resilient bearing material. Evidently the bearing surface temporarily depresses and allows the particles to pass between the moving surfaces with minimum of pressure and so prevents undue wear or scoring of bearing or shaft.

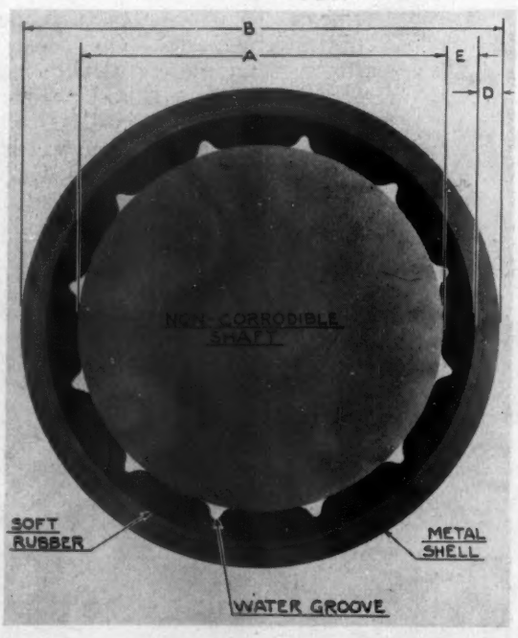


FIG. 2.—Cross-section of improved rubber bearing—full molded type.

Used for High Speeds

The upper limit of speed for water lubricated rubber bearings has not been determined. Laboratory tests have been conducted up to speeds of approximately 1500 fpm, which would cover most of the operating ranges. In some special applications, as for instance, racing boats, speeds of 12,000 rpm on 1-⅜-inch shafts (4300 fpm) have been attained, and rubber bearings used on boats of this class in record runs, tests and actual races, covering months of service, have shown no distress. Rubber bearings have been in continuous service for several years now on high head hydraulic turbines located in mountainous areas, having shaft speeds in the range of 500 rpm, on 15-inch diameter shafts, or surface speeds of almost 2000 fpm.

In the usual operating conditions, where the bearings are under load when the shaft starts to turn and where stopping and reversing are frequent, rubber bearings perform efficiently for long periods of time, usually measured in years, at bearing pressures up to about 35 psi of projected bearing area (i.e., diameter x length).

Under special conditions and in controlled tests, the bearings are known to operate well at higher loads, but most service conditions are far from ideal. Moreover, the load is obviously not uniformly distributed over the bearing area and the various faces do not equally share the burden. The faces nearest the direction of load carry the highest pressure. The portion of the total load which each face carries may be closely determined by converting the amount of deformation of each face along the bearing radius through its center, due to the deflection of the shaft in direction of the load, to the force required to cause such deformation (i.e., d_1 d_2, etc., = D COS θ_1 θ_2, etc., where d_1 d_2 is the deformation of each face, D is total shaft deflection due to load and θ_1 θ_2, etc., is the angle at center of bearing between direction of load and each particular face). Stress and strain data obtained from experiment or computation provide force vs. deformation values for each face. The load on each of the strips thus determined is then resolved into its reaction component (F COS θ) where F is the force known to be required to cause deformation on each strip. The sum of the reaction forces of all of the faces in the pressure half of the bearing equals the total load.

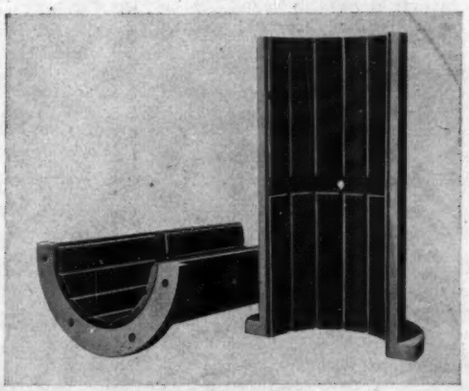


FIG. 3.—Full molded type rubber bearings are furnished solid or split, with or without flanges, ready for installation.

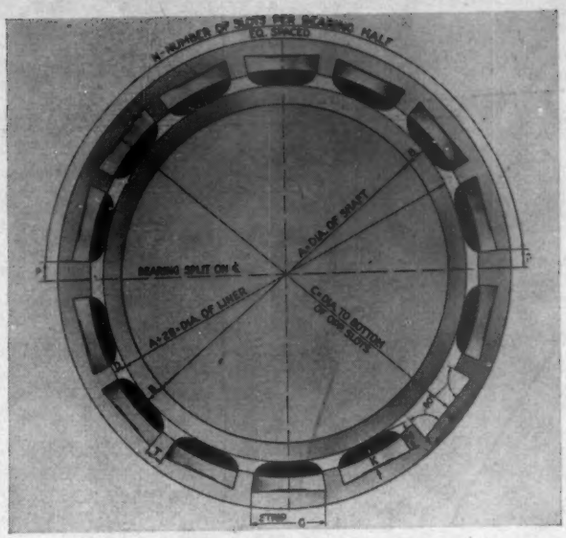


FIG. 4.—Cross-section of segmental type rubber bearing, usually used for large shafts.

Refinement of the process takes into consideration the initial clearance in the bearing. These calculations show some faces may carry 25% or more of the load, and consequently, actual pressure on the surfaces in contact with the shaft are substantially greater than the projected area unit loadings.

Many applications also involve overhanging loads on rather flexible shafts, as for instance, propeller strut bearings on vessels, which further serve to concentrate pressure at ends of bearings. For such conditions, generous shaft sizes to gain stiffness and liberal bearing areas are good design practice and provide economy in operation and maintenance.

Two Types of Construction

Multiple face type rubber bearings are currently constructed in two principal designs, each having some variations to suit conditions of service. One is the so called full molded type, and the other the segmental construction (Figures 2, 3, 4, 5 and 6). In the former, the rubber is molded to shape and extends in continuous lining around the shaft. Generally, the bearing material is formed and bonded inside of suitable metal shell. Since the molding process is subject to considerable dimensional variation, the bearings are finished by grinding the inside surface for proper fit on the shaft. This then produces a bearing surface conforming approximately to the shaft radius, as previously mentioned.

Bearings of standard constructions, that is, those intended for stock purposes, are made with naval brass composition shells (nominally 63% copper, 1 to 1-½% tin, balance zinc). This metal has been found to be the most adaptable to average operating conditions. It has good corrosion resistance to practically all water, including sea water, and has sufficient strength and rigidity to provide ample stability for the bearing lining.

It may be of interest to note that even though of comparatively recent origin, rubber bearings were the first among water lubricated type bearings to be made

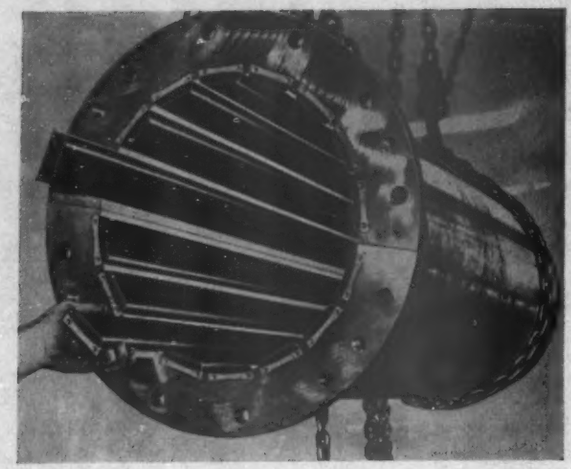


FIG. 5.—Segmental type marine bearing with easily replaceable wearing faces, for shafts of practically unlimited diameters.

in a complete schedule of standard sizes for use on marine propeller shafts. A schedule of these standard sizes, though not included in this paper, is available. The stock size bearings are provided with clearances suitable for operation on marine propeller shafts and length-diameter ratio is usually 4 or nearly so. Bearings with shells of other composition, including steel, stainless steel, Monel metal, aluminum, cast iron, and other materials, are furnished to suit various operating conditions. While the most economical form is the solid, cylindrical type bearing, without flange, particularly in the smaller sizes, the bearings may be made with flanges, and in halves, and in various forms, as best adapted to the application.

All-Rubber Type Bearings

For deep well pumps and certain types of other uses, such as agitators processing chemical liquids, it has been found advantageous to utilize bearings made without metal shells; that is, of an all-rubber construction. Such bearings do not, of course, have the rigidity of the metal shell constructions, and, therefore, are not as easily produced to precision tolerances. Provisions must be made in the method of installation to provide proper fit on the shaft and security of the bearing in the housing.

An example of such an arrangement is shown in Figure 10, which shows a type of deep well pump upper line shaft and bowl bearings. The housing is machined to specified inside diameter so as to produce proper effective bearing diameter after the bearing is pressed into place. The bearing is produced to provide snug fit in the housing and to attain the other conditions desired. Suitable shoulder is provided at one end of the bearing housing, and retaining ring at the other, to hold the bearing in place.

Standardization of sizes of this type of bearing, though highly desirable, has been found extremely difficult. Practices differ among the pump manufacturers and, consequently, bearing sizes number into the hundreds. A schedule of the more frequently used sizes, however, is available.

Segmental Bearings

Segmental type bearings are adapted particularly to large shafts. The predominant feature is the facility of installation and renewal of the individual bearing faces, as is apparent from the illustration in Figure 5. The bearing faces take the form of individual segments, or strips, consisting of the bearing material bonded to metal or other suitable backing. The rubber is molded to shape and ground to finished thickness.

It will be noted in Figures 4 and 5 that the bearing segments are constructed to fit a dove-tail slot in the bearing shell. The dimensions of the slots and strips are so arranged that when the bearing is assembled proper effective diameter will be produced and suitable fit will be accomplished of the strip in the slot. Special equipment designed and built for machining the slots is well

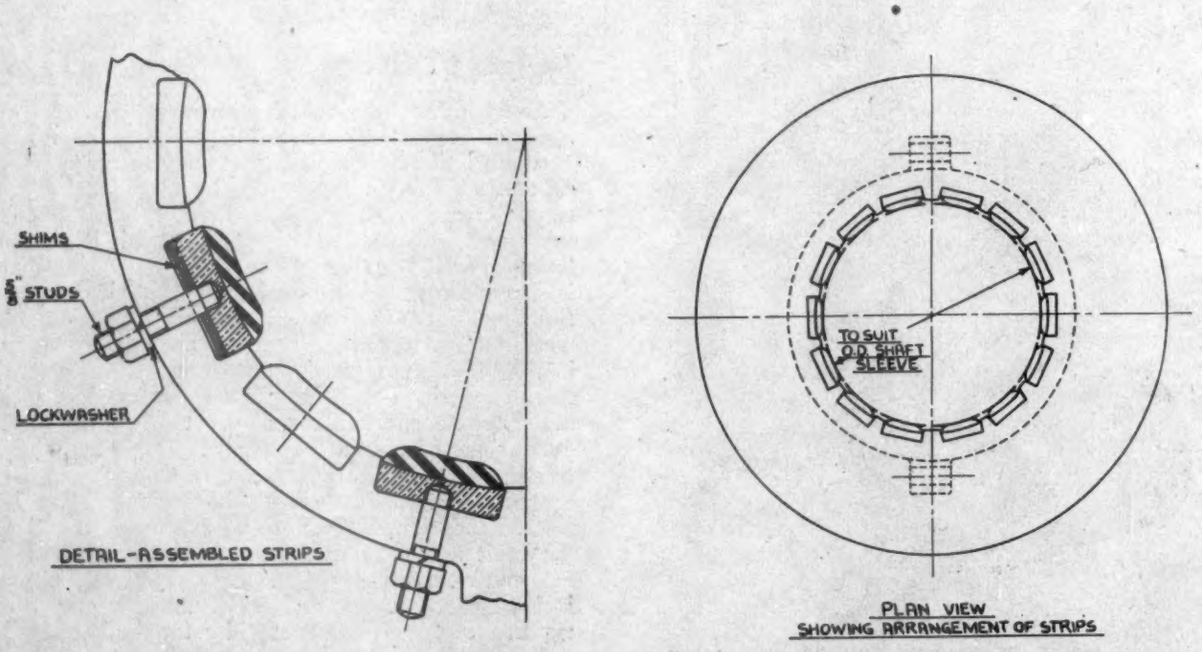
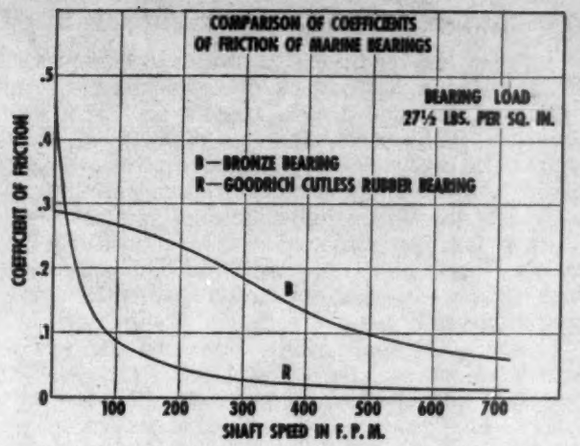


FIG. 6.—Rubber segmental type bearing for hydraulic turbine installations. The bearing faces are individually renewable and adjustable.



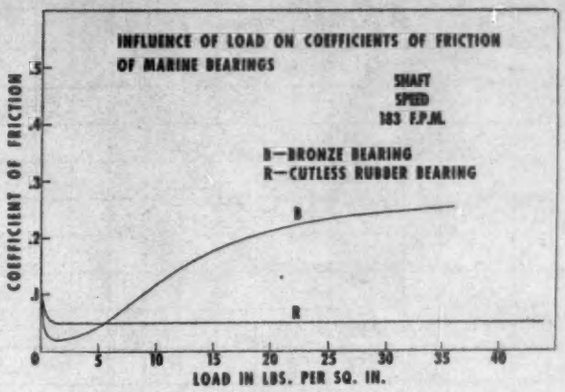


FIG. 7.—Curves showing effects of load and speed on coefficient of friction in rubber and bronze bearings when water lubricated. Note that coefficient of friction in the rubber bearing does not increase with either increase in speed or load.

described by C. C. Soper in his article published in 1946 (*2*). Different shaft diameters require varying cross-sections of strips.

Design developments and experience have established ten standard cross-sections which will provide assemblies for shaft diameters ranging from 6-¾ inches up to almost unlimited diameters by proper arrangement of number and size of strips. The surfaces of the strips are finished flat for purposes of adaptation to the various shaft sizes.

In Design Fig. 6 the strip, or segment, is produced with parallel sides and, as the illustration shows, is held in place by screws through the housing into the metal backing of the segment. This construction is especially adapted to large hydraulic turbine bearings and provides not only ease of installation and replacement but also adjustment for wear. Non-adjustable rubber bearings in hydraulic turbines have been known to operate without replacement for periods of more than 15 years. This adjustable feature has been introduced only within recent years and, therefore, the ultimate maximum service life is yet to be determined.

Oil Resistant Composition

All of the designs and construction herein described are presently being made with synthetic rubber compounds of the oil resisting variety. Development of the compounds for this specific purpose covers a period of a dozen years or more. Laboratory testing, and some of the results, are to be discussed more completely in another paper during this series of meetings (*3*). Experience in service confirms that these synthetic rubbers have as good, or better, wearing and friction properties than the best natural rubber compounds. They offer better resistance to heat and, of course, are not adversely affected by contact with oil or oily waters. Although deterioration, due to aging, has never been a serious problem even with natural rubber bearing compounds, these synthetic type rubbers eliminate whatever concern in this regard may have previously existed.

Clearances

Some water absorption may be expected of the rubber and rubber-like synthetic compounds, but dimensional expansion due to this cause is only a minor factor in the determination of clearances for rubber bearings. More important considerations are temperatures and character of the liquid surrounding and entering the bearing, permissible and desirable shaft deflections, and flexibility of the shaft and the supporting structure.

On marine installations, where shaft systems are extremely flexible and alignment is constantly subject to change, larger clearances are desirable than in most types of industrial applications. Range of clearances for the marine type bearings and those for some industrial purposes involving temperatures in the range of cold water applications are shown in Figure 9. Present type rubber bearings are being used at elevated temperatures up to about 180°F. However, for such applications, initial clearances are increased sufficiently to allow for the expansion of the bearing material caused by those temperatures.

The damping effect of the rubber and its sound deadening characteristics make it possible for these bearings to operate noiselessly and efficiently with larger clearances than bearings of hard materials. The rubber will not hammer-out, as some bearing materials will, and this property is particularly advantageous in such locations as rudder bearings or others when unbalanced

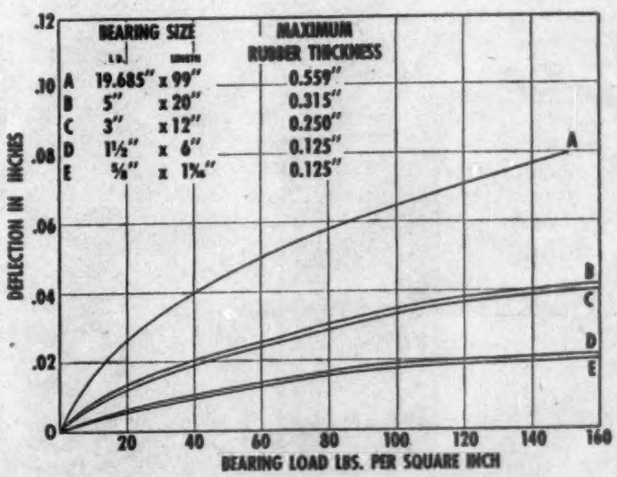


FIG. 8.—Load deflection curves on different size rubber bearings under varying load conditions.

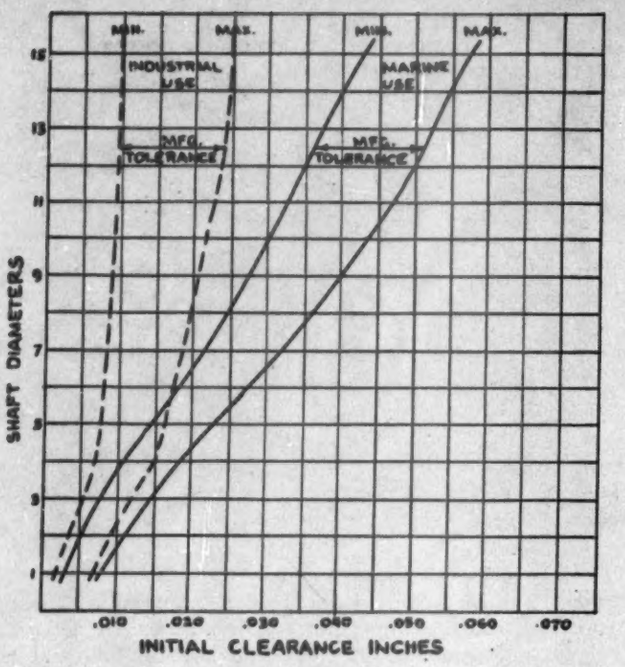


FIG. 9.—Initial clearances furnished in standard marine and industrial rubber bearing for cold water applications.

loads occur. Rubber bearings have on numerous occasions made possible emergency operation of vessels when the shafts or propellers became bent accidentally, and the bearings showed little or no distress as a result of the experience.

Proper Shaft Materials Improve Performance

Some of the conditions for proper operation relating to the bearings have already been mentioned. Among the most important factors outside the bearing which influence performance are the characteristics of the journals or shafts. Although abrasive particles suspended in the lubricating liquid have comparatively little effect on the rubber lining, the degree of roughness of the shaft surface is of major importance in rate of wear and friction losses in the bearing. Smooth, non-corrodible high quality shafts are, therefore, essential for good performance.

Commercial bronze shafts processed for service as shafting (not rod) and Monel metal are satisfactory for most waters, including sea water. On large shafts where wearing sleeves are provided at the bearing points, service experience indicates that the most acceptable general purpose materials are the Navy specification bronzes, Composition "G" or "M," particularly when centrifugally cast. Under some severe abrasive conditions, as on dredge cuttershafts, centrifugally cast Monel metal sleeves have proved economical.

Limited experience in river or lake waters, with sleeves fabricated from stainless steel plate, shows promising results. Metalized surfaces of stainless steel, Monel metal or bronze, on small or medium size shafts, have been found satisfactory in some fresh water operations. However, substantial variation in the performance of these metalized surfaces has been observed, apparently due to the various ways in which these surfaces are applied. More uniform, and perhaps better methods, seem to be needed. Chrome plated surfaces have shown outstanding performance, even in abnormally abrasive uses, but here again the method of applying the chrome plating is extremely important.

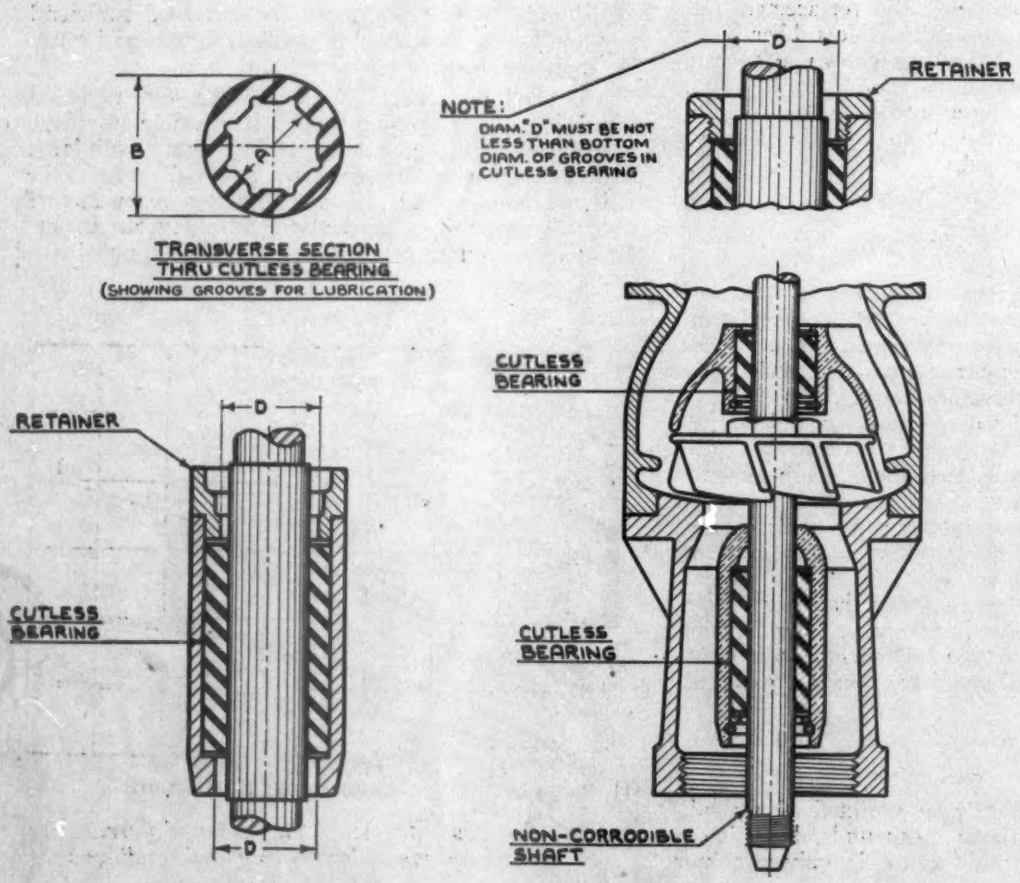


FIG. 10.—Typical arrangement of rubber bearings without metal shell on vertical upper line shaft and in bowls of deep well pump.

Circulation of Lubricant

Arrangements for circulation of the lubricant through the bearings is another important factor affecting performance. Some applications, as for instance, submerged rudder shaft or pintle bearings, do not require any special provision for circulation. In other cases, such as open strut bearings on vessels, the natural circulation of water due to the motion of the vessel and propeller action has been found to be ample. The bearings should, however, be so arranged that free flow is fully possible and such parts as fairwaters and ropeguards should be designed with that in view. Enclosed locations, such as stern tubes on vessels, should have a source of circulating water for the bearings. Part of the overboard discharge from circulating pumps for the stern tube bearings is usually sufficient.

The volume of water needed for purely lubrication and cooling purposes may, of course, be determined from known values of load, speed, coefficient of friction, and the desired temperature rise in the bearings. This disregards radiation through the shaft or other adjacent parts. Cornell and Beatty report that calculations compare favorably with experimental data (*3*). In their controlled test of a full size 10" x 30" bearing loaded at 6000# (20 psi) and shaft speed of 400 rpm, three gpm of water flowing through the bearing stabilized temperature rise at 9°F. In the same test, one gpm attained stability at 34°F. temperature increase.

Under service conditions involving a high percentage of sediment, however, it has been observed that higher velocities of flow through the bearings assist materially in the performance of shafts and bearings, and special provision for circulation of the lubricating water through the bearings is, therefore, desirable. Operators of hydraulic suction dredges have had unusual opportunities to recognize this advantage. The excellent performance of rubber bearings in the midst of the mud, sand and other abrasives loosened by the revolving cutter supported by the bearing, on dredge installations, is due in large measure to the good water circulation usually provided.

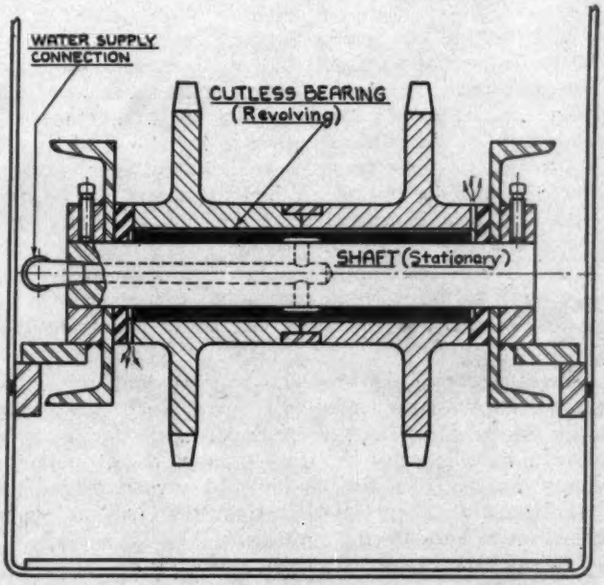


FIG. 11.—Rubber bearing in lower sprocket assembly of chain type conveyor surrounded by sediment. Circulating water enters bearing through stationary shaft, about which bearing revolves.

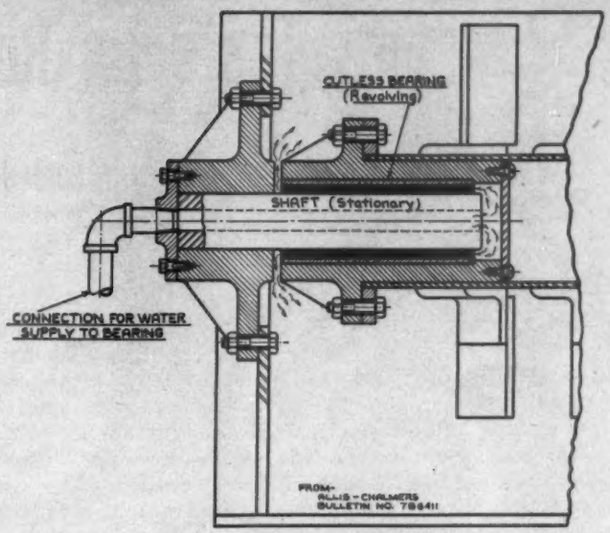

CUTLESS BEARING (Revolving)
SHAFT (Stationary)
CONNECTION FOR WATER SUPPLY TO BEARING
FROM- ALLIS-CHALMERS BULLETIN NO. 7B6411

FIG. 12.—Lower end of sand and gravel washer, with rubber bearing arranged to revolve around stub shaft, through which flushing and lubricating water is furnished.

Examples of other interesting arrangements are shown in Figures 11 and 12. Figure 11 shows a rubber bearing supporting sprockets at the bottom end of a chain type conveyor surrounded by abrasive sediment. The bearing in this case revolves with the sprockets about a stationary shaft through which the water is furnished, as shown. Fig. 12 shows a rubber bearing at the lower end of a screw type conveyor used in sand or gravel washing equipment. The bearing in this case also revolves around the short stub shaft through which the water is furnished.

These are but simple examples of the various means of providing good operating conditions and perhaps this outline of the methods of applying rubber bearings may suggest solutions to similar bearing problems.

Summary

Soft rubber and rubber-like synthetic compositions have been used as materials for water lubricated bearings for more than 25 years. They have shown important operating efficiencies and economies in pumping equipment, on marine propeller shafts, dredge cutter-shafts and similar applications, even when severe abrasive conditions exist. The elasticity of the bearing material, and bearing design, provide good friction characteristics, sound and vibration deadening properties, and abrasion resistance. Present synthetic materials are oil and heat resistant. Best performance is obtained when good quality non-corrodible shafts and shaft sleeves are present. In extremely abrasive or muddy water, special provisions for water circulation improve performance.

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(2) Soper, C. C., "Miller for Slotting Marine Bearings," *Steel*, pp. 102-03, 144 (July 15, 1946).

(3) Beatty, J. R., and Cornell, D. H., "Laboratory Testing of Rubber Bearings," Paper presented at meeting of Rubber and Plastics Division, A.S.M.E., New York, N. Y., November 30, 1948.

Fire Tests on Rubber Tire Storage

by NORMAN J. THOMPSON

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LARGE-SCALE fire tests of automobile tire storage show that tires are very easily ignited, that fire spreads rapidly and is difficult to fight with hose streams, and that automatic sprinklers require special close spacing and unusually high water pressures.

The tests were conducted by the Factory Mutual Laboratories at the Norwood (Mass.) Station. The immediate purpose was to determine the required sprinkler standards for a leading manufacturer who proposed to provide greater storage capacity through the use of wooden pallets, to be stacked 4 high with a lift truck, making tire piles 18 feet high.

The problem could not be answered on the basis of fire experience. Although fires in outdoor scrap tire storage have been quite frequent, there has been a rather surprising lack of recorded fire experience with finished tires stored under sprinkler protection.

The fire tests were arranged under a 33-foot ceiling, to approximate actual conditions in the warehouse. Several thousand scrap tires and a supply of pallets were obtained. Thirteen tests were made, using various piling arrangements, sprinkler spacings, and water pressures. Water was supplied by two fire pumps, operating singly or together as test conditions required.

During the tests complete records were kept of all factors having a bearing on the results. A constant check was made of pressures at sprinklers, pumps, and risers. Modern instruments continuously recorded temperatures at the ceiling over the fire, inside the burning pile and at surrounding locations. Even the oxygen content of the air was automatically sampled and recorded.

Main Fire Test House at Norwood (Mass.) Test Station of Factory Mutual Laboratories during rubber tire storage fire tests.

Burning of rubber tires soon after ignition. Note pronounced chimney effect.

Characteristics of Tire Fires

The tires could be ignited very easily—only a piece of oily waste the size of a golf ball was required. Spread of fire was rapid, due to (1) the low temperature at which rubber vaporizes, (2) the large amount of surface exposed, and (3) the chimney effect in the stacks of tires.

Quantities of dense smoke were liberated, which at first collected under the ceiling. When sprinklers opened, the smoke was beaten downward, hampering visibility and making efficient use of hose streams very difficult after the first five or ten minutes. Outer rows of tires acted as barriers to hose streams, showing that narrow piles are desirable so that the water can better penetrate to a fire in the center.

The intensity of the fires was so great that unless the piles were low or the sprinklers spaced much closer than in the standard system, fire continued to develop in spite of sprinklers. Some of the tests assumed the proportions of a serious factory fire, and would have damaged the Test House if a special deluge system had not been turned on to back up the sprinklers.

For the special piling method studied, the tests proved that sprinklers on a standard piping system (80-100 sq. ft. per head) will control fire only when (1) the pallets are stacked not more than two high (9 ft.), and also (2) when sprinklers are supplied with water at not less than 55 lbs. flowing pressure at the top of the riser. With

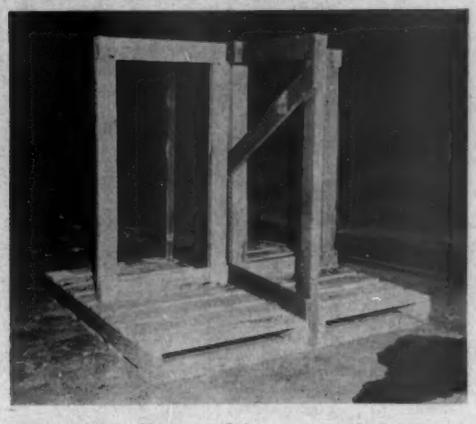
Test fire extinguished by automatic sprinklers on 7-foot spacing and with 55 pounds flowing water pressure at the sprinkler system. At standard spacing (10 feet on centers) or at lower pressures, the fire would not have been controlled by sprinklers.

double spacing (50 sq. ft. per head) and the same pressures, sprinklers can control fire in tires stacked to a maximum of three pallets high (13½ ft.).

Storage Without Pallets

The more common method of storing rubber tires is directly on the floor, in piles 8 to 14 feet high. Seven additional tests were therefore made, without pallets and under a 15-foot ceiling.

Sprinklers opened somewhat more quickly under this lower ceiling but the prompter operation had no evident effect. Sprinklers on standard spacing could not control fire in tires piled more than 6 feet high, even with the strongest practical water supplies. When sprinklers were spaced more closely, so that the rate of application of water was doubled, the fire could be held in check in tires piled to a maximum of 12 ft. If fire is not controlled in the early stages, more and more sprinklers will open, resulting in continued reduction of water pressure.



Type of pallet used in some of the tests. In other tests tires were piled directly on the floor.

For Positive Control of Fires in Tire Storage

(Piled directly on floor, without pallets)

1. Limit height of piles to 6 feet under sprinklers on standard spacing (80-100 sq. ft. per head). If this is not economically feasible, install the sprinklers on a special spacing of 50 sq. ft. per head, which will permit piling to 12 feet above floor. Provide clearance of at least 30 inches between top of pile and sprinklers.

2. Sprinklers should have an immediately available primary water supply of at least 500 g.p.m. at a flowing pressure of not less than 55 lbs. per sq. in. at the point where the sprinkler piping connects to the building riser. A total supply of 1000 to 2000 g.p.m., depending upon the amount of storage, is required, and hose streams will need an additional 500 to 1000 g.p.m. Fire pumps if needed must be automatic starting. Avoid dry-pipe systems, and provide water-flow alarms on wet-pipe systems.

3. Limit width of piles to 25 feet, to facilitate penetration of hose streams. Provide 8 to 10 ft. longitudinal aisles between piles, and frequent 8 ft. cross aisles. For complete accessibility, do not pile within three feet of building walls.

4. Avoid storing excessive values in tires in a single fire area. Consult insurance companies for acceptable limits. Subdivide storage by masonry fire walls where necessary.

5. Provide ample outside hydrants, and inside small hose and extinguishers. Keep storage areas clean, eliminate ignition sources, and provide good watch service. Train employees in fighting tire storage fires.

Eye Accidents in the Rubber Plants

TWO serious eye injuries were experienced in a rubber plant. In one case, a maintenance employee was using a hammer to pound a part of a tire-building machine out of its operating position. A small piece of the part broke off and flew into the employee's eye, causing a permanent injury. In the second case, an employee was installing a new knife on a bale splitter by tapping the knife with a hammer. A piece of the hard-steel knife broke off and flew about eight feet into the eye of another workman who was picking up a chisel to place it in a tool box.

These two accidents, and similar cases, show that pieces of metal frequently break off when hard metal is pounded with a hard hammer. These accidents also indicate the necessity of having all maintenance personnel wear eye protection, both when engaged in a hazardous job or when in the vicinity of an operation that involves an eye hazard. A great number of firms feel that all maintenance and construction employees should wear eye protection at all times. Undoubtedly, following this rule is the best way of enforcing the use of adequate eye protection.

Perhaps the eye protection program should be intensified by requiring that all employees who enter our work shops put on their goggles and keep them on while in the shop even though they may not be engaged in hazardous work themselves. They, of course, should also wear their goggles when doing eye hazardous work out in the plant away from the shop.

Rubber Safety Letter

Application of Dispersed Organic Colors in Rubbers, Vinyls and Other Plastics

By T. G. SULLIVAN and H. H. WATJEN

Sinclair and Valentine Co., New York 27, N. Y.

SINCE the beginning of the rubber industry with the discovery by Charles Goodyear of vulcanization, the public has demanded colored rubber goods. Early in the history of rubber, red iron oxide was used extensively as well as antimony sulfides, some ultramarine blue, chrome oxide green, and lamp black. The full gamut of rubber colors was then completed.

In fact, in many minds if a rubber article was any color besides iron oxide red, it was not true rubber. Some years ago on a fishing trip, our guide came prepared for high water with a pair of red rubber boots. Seeing my black boots, he exclaimed, "Them ain't rubber." My reply, of course, at the sight of his red boots was, "Them ain't either."

The real beginning of colored rubber started with the advent of organic accelerators. The shortened cures gave a chance to the unstable organic colors produced at that time. Reasonably bright hues were obtained with lowered sulfur ratios and cures of short duration. In the early twenties, reds of the lithol family, basic blue dyestuffs, and similar colors were used to some extent in both molded rubber goods and in proofing stocks.

At that time, the quality of the dry colors on the market was very questionable for rubber use. The only colors available were those used by the paint and ink industry. A fine particle size was not required because these colors were ground into their vehicles on a three-roller ink or paint mill. When these colors were used in rubber stocks, bad color dispersion due to the setting of rubber mills was commonplace.

Elimination of Early Difficulties

These troubles led to research on methods of eliminating them. Precipitation of the color in the presence of a natural rubber emulsion as a protective colloid prevented the particle size of the color from growing upon drying. This colloid was used in two forms, natural rubber latex and a man-made dispersion with Bentonite clay.

The natural latex carried a percentage of ammonia for stabilization; this, in many cases, caused bleeding of the organic colors which require pH control. The other form of a protective colloid, a neutral dispersion of rubber made with Bentonite clay, did not have this drawback and was used extensively in the manufacture of rubber color masterbatches.

Figure 1 shows excellent dispersion of color in a masterbatch made by the wet process described above. Some compounders, however, have prepared their own color masterbatches by mixing equal parts of dry color and rubber on a rubber mill. The quality of this type of masterbatch is shown in Figure 2. Note the visible particles of color in the masterbatch. This masterbatch was prepared by a rubber footwear manufacturer in a Banbury.

Another field of development, outside of the question of smaller color particle size and dispersion in the final rubber product, was the search for bright organic colors that would have better lightfastness and be more stable at high temperatures under reducing conditions in the rubber stock due to the sulfur and moisture present. It was also desirable to have a lower color solubility in the rubber hydrocarbon or in materials that were present in the average rubber compound, such as mineral oil, vegetable oil, stearic acid, coumarone-indene resins, etc.

The change of solubility of colors in rubber stocks from curing temperatures to room temperatures has been found to be the direct cause of bleeding and blooming. This condition is well known to most rubber men and is evident as the blooming of sulfur when a high concentration of uncombined sulfur is present in a rubber compound. Several of the common paint and ink colors have this serious defect. It has eliminated them from use in either rubber or plastic compounds. Examples of colors exhibiting this blooming are Toluidine Toner Red, Para Red, Fire Red Toner, and Hansa Yellow.

It has been found that colors containing the nitro group attached to the benzene ring in one or both of the aromatic organic color intermediates is a sure cause of the blooming and bleeding described.

In the yellow series, for years Hansa Yellow was the only organic yellow available to the rubber compounder. This color, in conformity with the preceding statement regarding nitro groups, is a bad bleeder. It is made from diazotized meta-nitro-para-toluidine and acetoacetanilide. In recent years Hansa Yellow has been almost entirely replaced by Benzidine Yellow which does not bleed in rubber compounds since it does not contain a nitro group; the meta-nitro-para-toluidine is replaced by dichlor-benzidine. Coupling of the diazotized dichlorbenzidine with phenyl-methyl-pyrazolone results in a nonbleeding bright color called Benzidine Orange.

In blues and greens, the pigments made from basic dyestuffs have been almost entirely replaced by the new phthalocyanine colors. These colors were discovered accidentally in England when a few blue specks were seen in the reaction product during the manufacture of phthalonitrile in a copper kettle. The blue product was isolated, purified, and identified as copper phthalocyanine. This accidental discovery has led to a big production in the blue and green color industry. The green is made by chlorination of the copper phthalocyanine blue.

These colors have been found to be very lightfast and to have no tendency to bleed or bloom. In general, they are excellent rubber and plastic colors if all free copper is eliminated from the color. Traces of copper can be tolerated with the use of one of the copper inhibitors on

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, Detroit, Mich., November 8-10, 1948.

Effect of Various Colors in Rubber and Vinyls

FIG. 1—Microphotograph showing good dispersion of color in masterbatch made by wet dispersion method (7000 magnification).

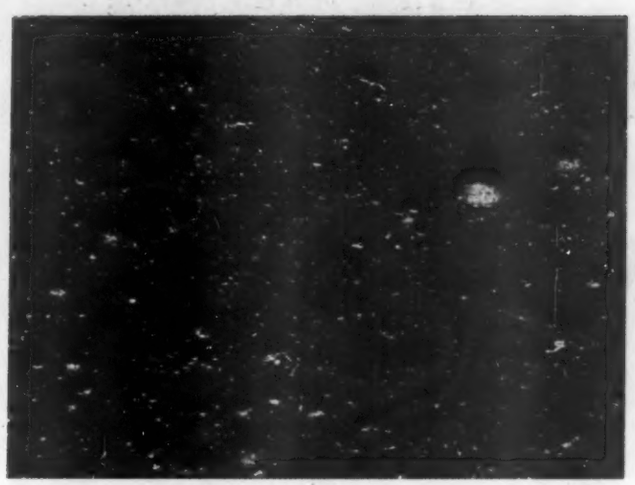


FIG. 2—Microphotograph showing poor dispersion of color in masterbatch made by dry mixing of color on an open mill or in Banbury (7000 magnification).

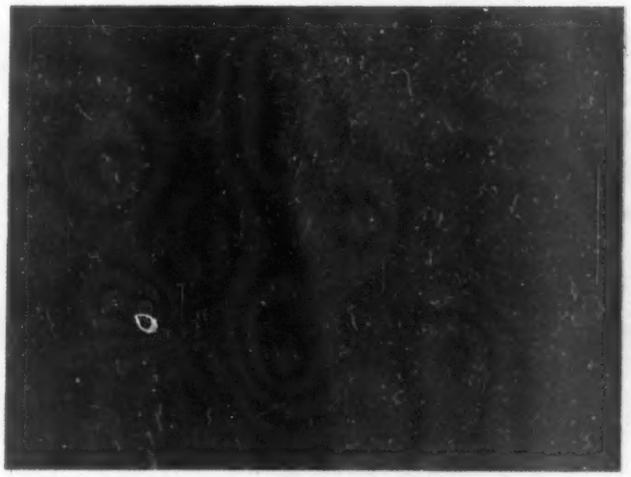


FIG. 3—Microphotograph of rubber stocks showing added color strength of dispersed phthalocyanine blue compared to stock made with an equal amount of dry powdered blue on right.

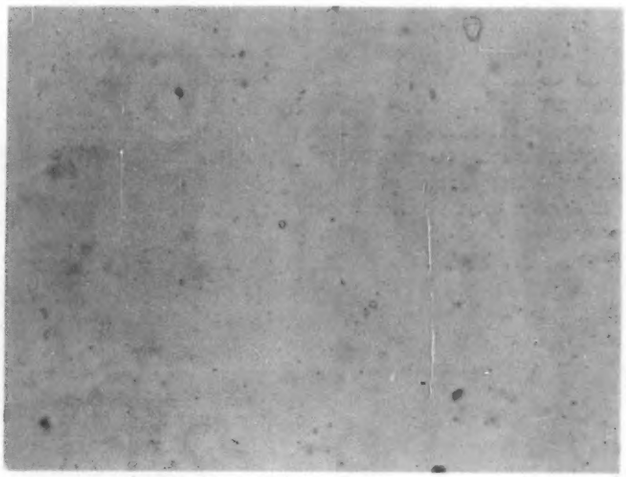


FIG. 4—Microphotograph of vinyl film made with wet dispersed phthalocyanine blue showing but few undispersed color particles (7000 magnification).

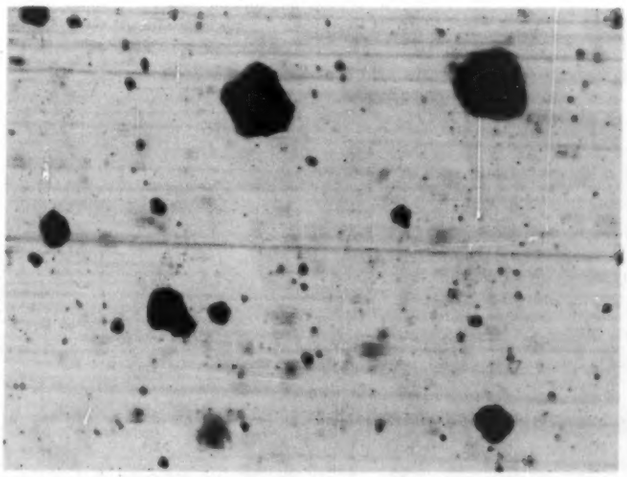


FIG. 5—Microphotograph of vinyl film made with phthalocyanine blue dry color (7000 magnification).

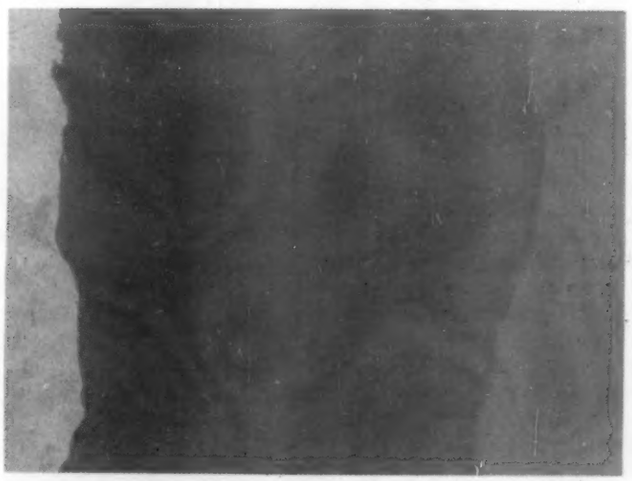


FIG. 6—Microphotograph of 3 vinyl films showing strength of dry phthalocyanine blue on left, wet dispersed color in center, and ink mill ground dry color on right.

Illustrations by courtesy of Harwick Standard Chemical Co., Akron 8, Ohio.

the market such as disalicylal ethylene diamine. Quite often these inhibitors are included in the dispersed phthalocyanine colors that are intended for natural rubber use.

The direction of research for high quality reds has been toward the substituted aromatic intermediates such as phenyl-methyl-pyrazolone and beta-oxynaphthoic acid. These are the intermediates of the best red pigments on the market today known, in general, as PMP Red and BON Red.

Problem of Compatibility

With the war, the accompanying rubber shortage, and the advent of synthetic rubber and the vinyl plastics, a new problem presented itself: To find a protective colloid that was compatible with all the synthetics as well as natural rubber. The dispersions already described were limited in use because of the incompatibility of natural rubber with some of the synthetics. Several manufacturers shifted to the use of GR-S latex, but the high pH and the lack of compatibility of GR-S with several of the new plastics limited the usefulness of these colors.

The first plastic color masterbatch was made in 1930 using the same general procedure described for rubber latex but with a synthetic emulsion of a phenolic resin.

A new type of dispersed color was developed during the war period from a new acid stabilized protective colloidal emulsion that was compatible with all the commonly used synthetic rubbers and many plastics. Such colors are controlled by rigid specifications covering both chemical and physical characteristics.

This protective colloidal emulsion has a pH between 5 and 6 and, consequently, does not cause subsequent trouble due to shade changes and bleeding of the color. If an exact pH of 7 is required by the composition of the color to prevent bleeding, it can be obtained with this protective colloidal emulsion by neutralization without change in its stability.

Approved Mixing Methods

The approved method of mixing dispersed colors is to add the color to the rubber on breakdown to assure complete mixing by allowing the color to be present during the complete mixing cycle. In mixing vinyl stocks on open mills, the color should be put on the mill first and allowed to smear on the tight hot rolls after which the resin mix is added, the mill opened, and the color dispersion completed during the mixing cycle. In Banbury mixing of rubber and vinyl stocks the same procedures are followed. Excellent color dispersion is obtained in all these cases. These procedures are not possible with dry colors as flying of color and bad dispersion usually occur.

When dispersed colors with a fine particle size are added to rubber on breakdown, the greatest strength is obtained from the color. There is no loss of flying dry color or contamination of adjacent stocks, and more strength is obtained for a given weight of color. Because of the inefficiency of using dry colors in rubber stocks in the case of the more expensive colors, it is more economical to use a dispersed color rather than a dry color. Figure 3 demonstrates this comparison.

One of the largest fields for dispersed colors is the new vinyl film industry where great emphasis is laid on the final particle size of the coloring pigment. Any large color particles will appear to the naked eye in a transparent vinyl film with a thickness of four thousandths of an inch. Many articles are prepared from a film of this thickness.

If dispersed colors with a compatible protective colloid are used in the correct way, a color particle size of almost colloidal dimensions is obtained in the finished product, as shown in Figure 4. It will be noted that very few particles of undispersed color appear. Figure 5 shows the questionable character of a film made with a standard blue dry color. Both Figures 4 and 5 used the same phthalocyanine blue.

In recent months there has been a general trend to cold mixing or preblending of vinyl resin mix ingredients in large powder mixers before mill or Banbury fluxing. In this mixing procedure, dry colors or color pastes are often used. To suit this change of procedure where standard sheeted dispersed colors are not applicable, a powdered dispersed color has been produced with but slight chemical change in its composition from standard dispersed color. The colors are produced in approximately the same particle size as the vinyl resin itself. They will mix well in the preblenders without flying and yield excellent dispersion during subsequent mill or Banbury mixing or in the barrel of plastic extruders.

It has been found that a minimum of cleaning is necessary where various powdered dispersed colors are mixed successively in the same preblender. With dry colors or paste colors, this cleaning problem has become a very serious one and must be figured in the total overall color cost of the compound.

The paste colors referred to have been made by several companies for use in vinyl compounds, but these have not been very successful due to the higher first cost of the colored compound and the difficulty of handling pastes. These pastes are made by grinding dry colors in vinyl plasticizers on a three-roll ink mill. In many cases, four or five passes through the mill rolls are required to obtain a suitable color particle size. When colors are first precipitated from their intermediates, the smallest particle size is obtained at the time of precipitation. If these colloidal color particles are coated with a protective colloid at this time, there can be no agglomeration of the color particles and no loss in strength on drying.

Powder grinding, or grinding in a plasticizer on the ink mill, is not necessary to obtain the fine particle size. Because the strength of any color pigment varies inversely as its particle size, a greater coloring power is obtained from an equal weight of dispersed color than from either a dry powdered color or a mechanically ground paste color, as shown in Figure 6.

When the various costs of the dry colors, the mixing with plasticizer, the ink mill grinding, the grinding losses, and mill cleaning are considered against the ease of handling and cleaning of plastic processing equipment used with dispersed colors, the saving in the use of dispersed colors either sheeted or powdered in vinyl or rubber compounds is considerable.

In many plants that produce both rubber and vinyl products, one inventory stock of colors can be used interchangeably in either class of product because of the complete compatibility of the protective colloid in the new type of dispersed colors with natural and synthetic rubber and most synthetic resins.

Other physical properties besides particle size are also influenced by the masterbatching procedure. Bleeding and crocking are decreased because of the protective colloidal envelope surrounding each microscopic color particle.

Theories on Bleeding and Crocking

Several theories have been advanced to explain why some colors bleed and crock and other colors do not.

Because no one reason explains the bleeding of all colors, the most logical explanation seems to be a combination of the following conditions which are postulated as causes of bleeding or crocking:

1. Large particle size or poor dispersion of color in the finished stock.
2. Incompatibility of any of the various ingredients of the compound.
3. Chemical composition of the color, whereby certain chemical groups are the causes of bleeding.
4. Solubility of the color in either the resin or plasticizer.
5. X, the unknown quantity, which may be that the electrical charge of the particles of color is the same as the electrical charge of the particles of some other major ingredient in the compound. If the charge of a color particle is the opposite of the charge on a particle of some other ingredient in the stock, the color particle will be attracted into the internal portion of the compound. This will tend to decrease the migration to the surface of the film and therefore decrease the tendency to bleed or crock. Conversely, if the two charges of the color and other ingredient are the same, the color particle will be repelled to the surface of the compound, and the tendency of the color to bleed or crock is increased. This may explain some cases of bleeding where a small percentage of color will crock while larger percentages will not.

It has also been suggested that much of the crocking of colored vinyl film is not crocking at all but abrasion of the colored stock. If the compound is balanced with a fine particle size filler, crocking or abrasion will be reduced considerably.

The addition of about ten per cent of a filler such as calcium silicate to a crocking red vinyl compound will reduce this tendency. This may be due to an increase in the abrasion resistance of the compound, or it may be a change in the balance of the electrical charge of the pigment particles in the compound.

Moore has reported that the tensile strength, abrasion resistance, tear strength, modulus, etc., are dependent upon the particle size of the filler and pigments in vinyl compounds.* Similarly, in rubber compounding, the use of fine particle size fillers will reduce the tendency of colors to crock.

* Moore, Robert L., "Properties of Fillers in Vinyl Plastics," *I.R.W.*, Vol. 118, p. 232 (May, 1948).

From the foregoing, it will be seen that the question of many of the physical properties of a colored stock relating to color are not only dependent on the color present but also on the other constituents of the compound.

The question of heat and light stability of various colors is also greatly affected by the other materials present in the compound. If an efficient vinyl stabilizer is not present in the compound, a considerable effect will be noticed on the shade of colored stock when exposed to heat or ultraviolet light for extended lengths of time. This is due to the liberation of the hydrochloric acid and a change in the pH caused by depolymerization of the vinyl copolymer. Many of the heavy metals in the form of soaps used as parting agents, salts of some colors, or contamination in fillers will cause serious discoloration due to depolymerization; they should be scrupulously eliminated from the vinyl stocks.

In rubber stocks, serious discoloration will result on exposure to sunlight and heat if proper antioxidants, copper inhibitors, and sunproofing agents are not included. Heavy metals such as lead and iron must be eliminated if bright colors are to be obtained because their sulfides are black.

Very careful choice must be made of accelerators if discolored stocks are to be prevented on vulcanization. In general, alkaline accelerators, such as the guanidines and the condensed anilides, must be eliminated from light colored compounds.

Conclusion

The introduction and use of new compounding agents in the rubber and vinyl plastics industries has complicated the use of colors. Some colors have been eliminated from extensive use because of the higher quality demanded in products and new manufacturing conditions. The introduction of various synthetic resins and plastics has limited the use of some types of dispersed colors.

Because the new type of masterbatch colors discussed in this paper are compatible with all types of natural and synthetic rubbers, resinous compounding materials, and many plastics, such as the vinyl chloride-acetate copolymers, vinylidene chloride copolymers, polyethylene, phenolics, and ethyl cellulose, they find extensive use in the modern rubber and plastics industry.

Diameter of Steam Line Important Factor in Steam Loss

REGARDLESS of the thickness of insulation used, a surprisingly large loss of steam superheat may occur if the diameter of the steam line is too large for the desired steam flow conditions, according to the Magnesia Insulation Manufacturers Association.

Such a case occurred recently in a plant where an outdoor line, 6 in. in diameter and 925 ft. long, with an ambient air temperature of 80° F, was used to transmit superheated steam at 250 psi and 600° F. The line was insulated with 2-5/16-in. thick 85% magnesia pipe insulation. However, the steam temperature at the end of the line was only 450° F.

An analysis indicated that the steam velocity in the line was only a little over 1,300 ft. per minute, whereas it should have been between 6,000 and 10,000 ft. per minute. The result was that, due to the relatively large size of the pipe and the relatively low steam velocity, there was a large drop in superheat. The investigation showed also that simply increasing the amount of insulation would have no appreciable effect on the extent of superheat loss. The recommendation was that it would be cheaper and more satisfactory to replace the 6-in. line with a 1½ or 2-in. pipe, insulated with 3-in. thick 85% magnesia.

Literature on correct procedure for piping system design, recommended pipe sizes, steam velocities, flow conditions, etc., may be obtained from valve and piping manufacturers and fabricators. The information is also available in the various engineering handbooks. Literature on recommended thicknesses of insulation can be obtained from the Magnesia Insulation Manufacturers Association, Washington 4, D. C.

Cooling of Calender and Mill Rolls

By JOHN J. MAYER

Mayer Refrigerating Engineers, P. O. Box 6, Rutherford, N. J.

ALTHOUGH there have been many attempts made to solve the problem of properly cooling mill and calender rolls, no adequate solution has heretofore been achieved. Numerous methods have been tried, many of them involving expensive approaches, and some of them have resulted in partial success, but the problem is one which continues to plague factory operators in the rubber, plastics and allied fields.

Rolls of this type have a tendency to accumulate heat to the point where production has to be slowed down or brought to a complete halt until the roll or rolls cool down sufficiently to permit continuation. This is primarily due to the thickness of the shell and the weight of the roll, factors involved in the building up and storing of heat in the metal, which usually takes a considerable time to dissipate.

These slowdowns or shutdowns have a serious effect on production, an effect that is more serious than is generally realized. Because overheated rolls have become an accepted problem, production lines in most plants have been slowed down or adjusted to meet the condition. Where this situation exists, the slightest change in stock formula, working temperatures, room temperatures, speed, and other factors, will often throw the system out of balance with resultant headaches. The author is familiar with cases where 20 to 30 percent of lost production has been traced to this specific cause.

Deterioration of stock being worked on the rolls is also a probability where overheated rolls are concerned. The danger in this case is the fact that unfortunately the deterioration may not be determined at the time it occurs but only after the end product is in the hands of the consumer. Every manufacturer is vitally concerned with rejects and returns, but few realize the basic fault can be traced to overheated rolls.

Because of all of the above listed cost factors, the possible elimination of inadequate cooling of mill and calender rolls merits every consideration. The initial cost of installing any method which will adequately cool these rolls should be considered and weighed on the basis of eventual savings. A long range look is definitely called for in this instance.

An Approach to the Problem

One possible reason why this problem has not been heretofore solved is that the proper approach to the specific problem of heat transfer or dissipation of accumulated heat, particularly as applied to mill and calender rolls, is not too well understood. It is thought by many that the thickness of the metal is the restricting factor. This is erroneous, as the K factor, or rate of heat flow through the metal, is much faster than through the surface film. The actual thickness of the metal has very little effect on the U factor, or over-all heat flow, of this type of roll. Much too little attention has been paid to the surface film.

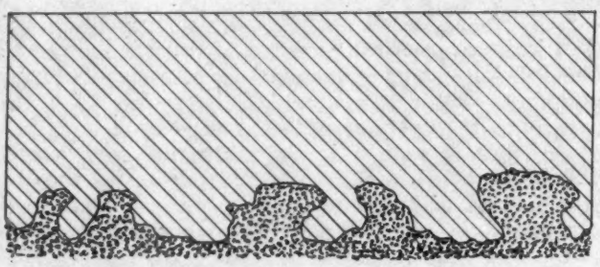


FIG. 1—Surface and film on typical roll.

Taking into consideration previous work done on the problem and the specific factor of surface film, the author and his associates have worked out what we believe to be a satisfactory solution. In working out this solution several interesting factors presented themselves which we feel are worth discussing, particularly the reasoning and the approach.

For the purpose of this discussion, consider the presently used chilled iron roll with a core of approximately one-half to two-thirds the diameter of the roll. To narrow this further and for the purpose of clarity, consider a specific roll of a popular size, i.e., 20-inch outside diameter with a 12-inch core. This leaves a 4-inch thick shell. The length of the roll, the number and position of the rolls per unit, temperatures and work load need not be considered for the purpose.

Remember that we are considering a roll the main function of which is not to cool the stock it is working but rather to remain at a temperature sufficiently cool to allow operation without shutdowns. This means that the heat is flowing through the outside surface film as fast and often faster than is desired. For properly

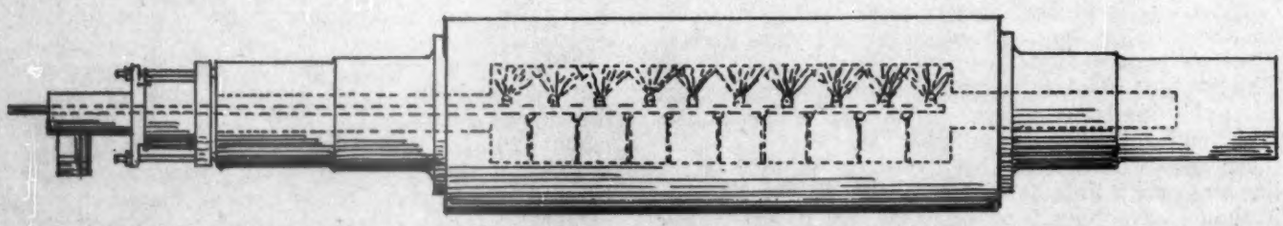


FIG. 2—Phantom view of roll.

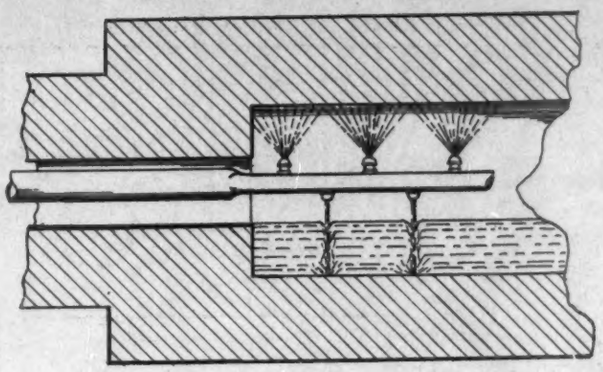


FIG. 3—Sectional view of roll.

cooling the roll we obviously do not have to consider the outside surface of the roll in the matter of heat transfer. Neither do we have to consider the thickness of the metal in the case of mill or calender rolls because, as outlined above, the heat flow is much faster through the metal than through the surface film. The only item we must consider carefully is the inside surface of the roll in connection with other factors, particularly the following:

(1) In the case of the hypothetical roll under consideration, the outside surface is almost twice that of the inside surface. This is a factor contributing to the excessive heat buildup and must receive careful consideration.

(2) Usually the bore through the bearing to the core is small and acts as a restrictive barrier to the sufficient flow of any cooling liquid both in and out of the core. This, too, is a major factor.

(3) The inner wall of the roll is usually comparatively rough, and this construction has a strong tendency to trap an extra thick layer of the cooling fluid on the surface of the roll, thereby adding to the surface film and further slowing down the heat flow.

(4) The small diameter of the core in conjunction with the rotating action of the roll causes the liquid to follow the roll by centrifugal force, the extent being determined by the inside diameter and speed of the roll. This is a factor that cannot be ignored.

Solution of the Problem

In refrigeration engineering circles it is reasonably well understood that the surface film is the actual barrier to heat flow. However, the actual formation of the film as it pertains to rolls is not so well understood and accordingly methods used to remove all or part of the film were inadequate. In too many cases, it was actually ignored.

To secure a better understanding of this film, consider the inside of a roll. As smooth as it may seem, microscopic examination of the inside surface of an average roll will reveal mountains and valleys which entrap the molecules of the cooling fluid, as indicated in Figure 1. The layers trapped in the valleys quickly become hot and since they are not constantly replaced with cool layers they quickly form a film which slows down the heat flow. When a roll is too full of cooling fluid or is running at a speed at which the liquid follows the shell by centrifugal force, the films build up much more rapidly and still further retard heat flow. Based on these factors a method has been devised, on which patent application has been made, and which has proved to adequately cool mill and calender rolls.

Obviously, the effects of each factor had to be minimized in order to increase the heat flow substantially. A stuffing box was designed sufficiently large to allow the cooling fluid to run out by gravity at a rate sufficient to keep the roll one-half or less full when the roll was fed at top operating pressure and volume. This was accomplished by taking full advantage of the bore in the design of the outlet. With the assurance that the roll would never be more than 50 percent full, it is reasonable to expect the thinnest possible liquid film on the top half of the roll consistent with its speed, providing the cooling fluid in the bottom half is arrested from following the shell by centrifugal force.

Through the stuffing box and outlet is inserted a liquid feed pipe equipped with two series of nozzles placed at right angles to the horizontal. One series of these nozzles is on the top facing up, the other series is on the bottom facing down (see Figures 2 and 3). The top series consists of solid cone spray type nozzles, spaced to overlap the spray; the bottom series contains jet type nozzles.

The top spray nozzles have a single purpose, i.e., to force impingement of the cooling liquid on the exposed inside surface of the roll with such force or velocity as to break up and force out the entrapped hot liquid molecules in and on the surface of the shell and replace them with new cool molecules, thereby breaking down the inside surface film and increasing the heat flow on the top half of the roll. The bottom jet nozzles have three main functions, as follows:

(a) To force the cooling fluid through the liquid in the bottom half of the roll and impinge on the bottom of the shell thereby forcing out the entrapped hot liquid molecules on the bottom (but to a lesser degree than the top solid cone shaped nozzles since the jets contact a smaller surface area).

(b) To add to the turbulence of the liquid in the bottom half of the roll, thereby increasing heat transfer by quickly displacing warm layers of liquid with cool layers.

(c) To prevent the possibility of the liquid following the inside of the shell by centrifugal force, which is achieved since the jets of cooling fluid present a barrier due to their strong downward velocity through the liquid.

In the design and test of the nozzles, feed pipe, outlet

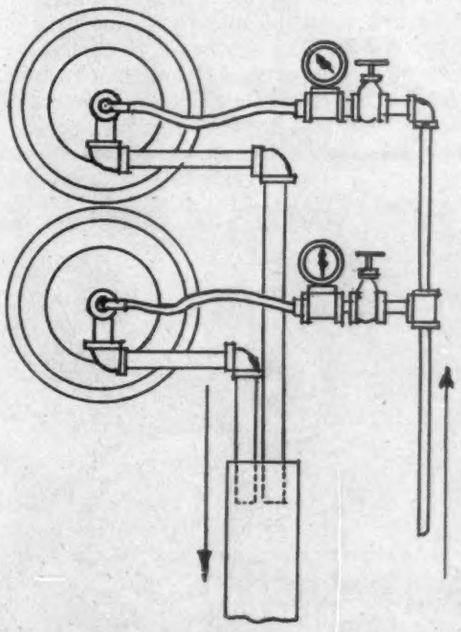


FIG. 4—Typical roll connections. (Note pressure and regulating valves.)

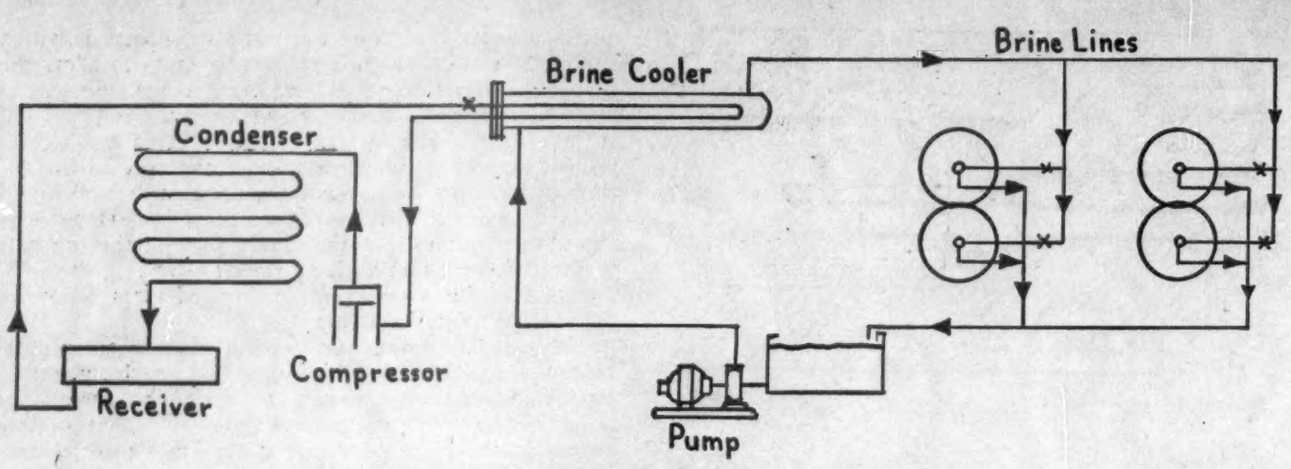


FIG. 5—Typical flow diagram for applied refrigeration.

pipe, stuffing box, liquid pressures, etc., first consideration was given to increasing to a maximum the over-all heat transfer of the inside of the roll. The second to construction which would permit application to present rolls with a minimum of alteration or adjustment. Third to simplicity of control. And fourth to accessibility for maintenance.

All of the component parts described above are assembled into a single unit. When installed, a hand-operated gate valve is provided on the feed line in order to adjust the system for varying conditions and loads. A pressure gauge is also provided after the regulating valve (as indicated in Figure 4) to act as a guide with relation to the rate of flow. With such an installation it is only necessary to reduce the cooling liquid pressure by adjusting the liquid gate valve, automatically reducing the quantity of cooling liquid flowing into the roll, as well as the impingement action, and at the same time weakening the barrier to centrifugal force in the liquid portion of the roll, all in direct proportion to the pressure reduction, thus reducing the heat transfer rate as desired to fit the load.

In actual installations, the system described increased the heat flow through the rolls by at least five times that of conventional cooling systems. It should be pointed out, however, that in many cases the cooling fluid (usually water) is of insufficient pressure, or quantity, and sometimes too warm to dissipate the heat as fast as it will flow through the roll with increased heat transfer. When such conditions were met in the installations mentioned it was found necessary to install a referigerating system to work closely in conjunction with the cooling device.

If it is found essential to utilize refrigeration it is necessary to determine the temperature fluid required to obtain satisfactory results at maximum load and heat transfer of the rolls. This varies, of course, with each product, type of equipment, stock handled, etc., and the refrigerating cycle must be designed to meet specific conditions. A typical flow diagram for such a cycle is shown in Figure 5.

Conclusion

When the cooling system described is installed, combined with the refrigerating unit where conditions require, experience has indicated that mill and calender rolls require rare slowdowns or shutdowns due to overheating. In several cases, the speed of production lines has been increased over what was generally considered normal by the installation of such equipment. In the opinion of the author, the development of the cooling equipment described fully answers the problem of overheating mill and calender rolls.

Hazards of Unlabeled or Inadequately Labeled Solvent Containers

UNLABELED or inadequately labeled containers of solvent are serious hazards, as was demonstrated recently when a field engineer mistook a jug of solvent for a water jug and drank from it. There were no indications of the nature of the contents on the jug which had been used to refill containers of solvent and then left on the shelf where the water jug was usually placed. The accident caused six weeks' disability.

Another source of accident is the substitution of one solvent for another without a change of labels on the container. The exchange of a flammable for a nonflammable solvent in this manner may result in fire. Such an accident occurred when a highly flammable paint thinner was put on a rack in place of the solvent ordinarily used for cleaning purposes. The janitor did not know of the substitution and cleaned the floor around an electric motor with the paint thinner.

Drums of solvent obtained from the manufacturer are generally labeled with information which indicates whether the contents are flammable, toxic, or both, and gives the most important precautions to be observed. After the solvent is received in the plant, it is often poured from the original container into bottles, cans, jugs, etc., for distribution as needed. These smaller containers should have labels which duplicate the information on the original label. Otherwise, the safety information on the drum in the storage room will be of no use to the men handling the containers out in the shop.

Solvents purchased from sources other than the manufacturer do not always carry precautionary information. In such instances, proper warning labels which may be obtained from the manufacturer should be put on the container before the solvent is put to use.

Safety Research Institute.

New Type Curing Bag Connections Reduce Tire Processing Costs

IMPRESSIVE economies in the curing room of a midwestern tire company have resulted from the adoption of new types of air, steam and water line connections and their use over a period of almost two years, according to the manufacturers of the connections, the Hydrolock Manufacturing Co., of Mansfield, Ohio. Marketed under the trade name of "Hydrolock," these connections and accessories are applicable in many industries and for various types of fluid lines, but almost the entire output of the company is devoted to the types and sizes suitable for tire curing room use. The following data on these new items have been furnished by the manufacturers.

The Hydrolock items for curing use are (1) an air bag stem adapter for attachment to the bag stem, thus fitting it for quick connection to the various lines used in the curing process, (2) an air cap, for attachment to the adapter to provide a pressure tight seal, and (3) a hand grip for attachment to air, steam or hot water lines. The hand grip is made in three types, i.e., an automatic cure type, a pot heater standard type, and a pot heater water cure type.

Operations with the new type connections and accessories in the tire plant mentioned have resulted in a number of definite economies. These include: savings in compressed air and steam in curing; reduction in spoilage losses; reduction in breakage of connectors and pigtails in automatic curing; elimination of some operations in the curing room; prevention of the overtaxing of compressors; reduction in the curing of air caps in tires; reduction in time required to connect hand grips to adapters; reduction of hazards and hardships for heat men, and, finally, improvement in finished product.

The Hydrolock adapter is shown in Figure 1. It is practically indestructible under normal operating conditions, with numerous tests indicating that 10-ton blows on a one-half inch square area are required to distort it. The adapter is joined to either the air cap or the hand grip with a bayonet type connection. It features extremely rugged construction and precise seat sealing. This combination has practically eliminated adapter failures in pot heater curing, where a single failure can ruin from 15 to 20 tires. Adapters previously used in the tire plant mentioned had been expended at the rate of approximately 4000 per month, whereas over 6000 Hydrolock adapters have been in service for well over a year in one curing room and are still in service. It is estimated that the Hydrolock adapter will outlast other types by 300 to 1.

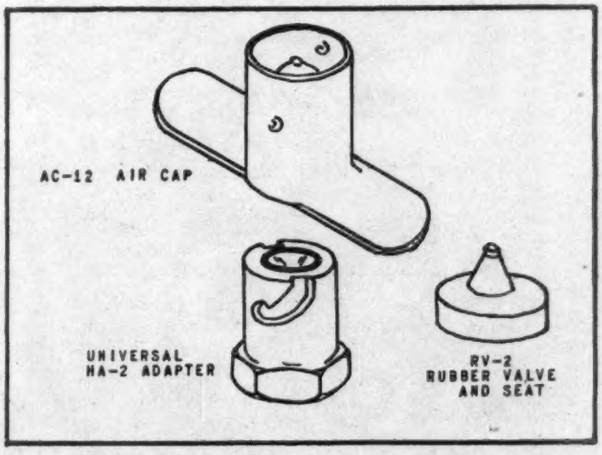


FIG. 1—Outline sketch of the Hydrolock adapter (bottom) and air cap (top). The rubber seat for the air cap, seen at the right, is surmounted by a small conoid, split so that it can admit air, steam or a pressure gauge from the outside.

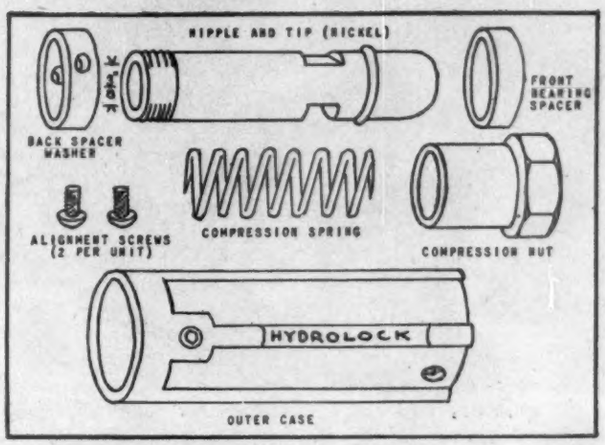


FIG. 2.—Component parts of the Hydrolock hand grip, including outer casing, plunger nipple and spacers, and compression spring. The spring is preloaded in assembly so that it does not require adjustment at any time.

The air cap, also shown in Figure 1 (top), is quite simple in design. The shell is brazed to a flat stamping with a hole punched at the center. The seat of the cap is a soft rubber plug (Figure 1, lower right) surmounted by a small conoid which is so split that it can admit air, steam or a pressure gauge from the outside, yet is tightly closed by pressure from the inside. The cap has no moving part and is so made that it can be locked tightly in the bag stem adapter by a simple quarter turn. It can be disengaged just as quickly and easily.

The component parts of a typical Hydrolock hand grip are shown in Figure 2. They include an outer casing designed to provide positive gripping action to the operator, plunger nipple and spaces, and a compression spring. The spring is designed to allow maximum compression and constant flexing. Both ends of the spring are squared and ground, and it is preloaded in assembly so that it needs no adjustment at any time. The spring is compressed to a maximum when the grip is engaged with the adapter.

As indicated above, the installation of Hydrolock fittings in the tire plant has resulted in specific econo-

mies, determined after a long period of observation and cost comparisons. For example, savings in the use of compressed air and steam in curing operation have amounted to a minimum of 10 percent. Spoilage losses caused by failures due to distorted and leaky adapters and failure of gaskets have been reduced in excess of 35 percent. This reduction alone has resulted in substantial dollar savings.

Breakage of pigtails, connectors and armored flexible tubing is a serious problem in all tire plants, not only due to the cost of material for replacement but to the maintenance time involved in making the replacement. The tire plant in question was no exception, but use of the Hydrolock fittings reduced replacements by 35 percent in automatic cures and 40 percent in pot heater cures. This saving is primarily attributed to the fact that the Hydrolock hand grip does not twist cable or pigtail in engaging or disengaging and its decidedly lighter weight puts less strain on rigid tubing, as indicated in Figure 3.

The design of the hand grip has also been responsible for eliminating hazards to heat men in the tire curing room arising from the engaging and disengaging of connectors. There are five specific reasons involved in this instance, as follows: (1) There are no open holes in the grip to permit escape of steam on the hands of the operator while disengaging connectors; (2) The outer casing of the grip overlaps the adapter so that when disengaging the steam or fluid is forced away from the operator instead of escaping in his direction; (3) The outer casing of the grip is made of aluminum and is cooler to handle; (4) The ribbed surface of the casing provides a firm grip; (5) There is no forward movement of the operator's chest or forearm toward the adapter in engaging the hand grip since an easy quarter-turn locks the grip to the adapter. In addition, since there are no gaskets or packing glands used in the construction of the hand grip, the operator is not required to inspect the forward end at any time.

Operational advantages derived from the design of the air cap include reduced maintenance costs. The design of the cap has resulted in other operational advantages as well. For example, the air bag can be inflated while

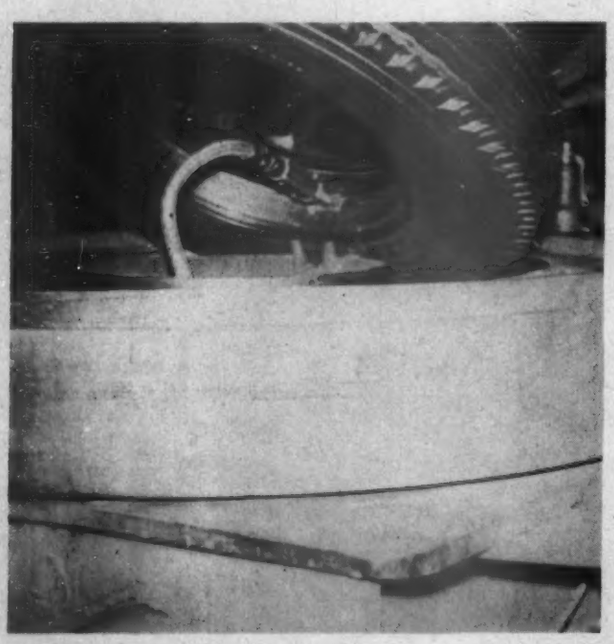


FIG. 3.—Application of the hand grip in an automatic curing process. Its light weight puts minimum strain on rigid tubing.

FIG. 4.—Air bags can be inflated while the Hydrolock air cap is on the stem adapter, as shown here, thus dispensing with the need for one air man in each production line.

the cap is on the stem adapter, as shown in Figure 4, thus dispensing with the need for one air man in each production line, and positive and uniform pressures can be maintained. (In many cases large capacity air regulators are recommended to be used in the line to insure uniform pressures in the inflation of bags in green casings). If desired, a gauge can be inserted through the cap seat to check the pressure in a green tire. An important safety point is the eliminating of scalded hands and arms while inflating the bag.

Incidentally, the air bag is cured with the Hydrolock Universal adapter and thus the adapter never need be removed from the bag as it can be used with the Hydrolock grip for steam and air, the water cure grip, or the automatic type grip. These three grips have different size orifices. Neither is it necessary to remove the adapter where automatic bagging machines bagging 10 to 13 tires per minute are in operation, as the rugged construction of the adapter will stand up to this treatment. The adapter is truly "universal" and eliminates any time previously spent in changing adapters for different types of operation.

Use of the Hydrolock air cap also prolongs the life of the air bag. It is a protection against fluid entering the air bag when it goes through a dip tank for cleansing purposes and for lubricating to prevent the casing from adhering to the bag during the curing operation. The cap also allows for uniform pressure in the air bag while in green, uncured tires, thus preventing tires from elongating when hung on a conveyor or rack, and consequently making it easier to lay green tires in the mold for curing. This results in the elimination of "drag down" or shearing of head material when the mold is closed.

Several product improvements have been traced to the installation and use of Hydrolock fittings in the midwestern tire plant. These include: (a) Uniform curing of casings due to uniform pressures maintained in the process; (b) Closer knit plies; (c) Deeper impregnation of rubber into the fabric and cords, and (d) Longer than average vent tits and full relief and square corners on the tread design. The latter improvement claim can be noted in Figure 3.

Investigation on the Nature of Adhesion

IN RECENT YEARS the nature of adhesion has become the subject of a fundamental research program at the National Bureau of Standards at Washington, D. C. This project, sponsored by various government agencies, was initiated in 1945 with a survey of the literature on adhesives and the theory of adhesion *(1)*.

Because of the dearth of comprehensive data in this field, the Bureau extended this program to include investigations of the adhesive properties of a wide variety of adhesives and adherends. Results of this research, conducted by N. J. De Lollis of the Bureau's Organic Plastics Laboratory, have led to a better understanding of the specific attraction between various types of adhesives and adherends, and hence more complete knowledge on the nature of adhesion *(2)*.

Prior experimental work on adhesives has been concerned largely with the development and use of products for specific industrial purposes. For example, the aircraft industry has employed adhesives extensively in airplane assemblage. Current interest in sandwich construction also serves to emphasize the increasing importance of adhesives in new types of airplanes. The small boat industry has made wide use of the more recently developed waterproof adhesives not only in making plywood boats but also in forming boats under low pressure from glass cloth laminates.

Among the adhesives included in the Bureau's investigation were cellulose nitrate, polyvinyl acetate, resorcinal-formaldehyde, casein, gum arabic, natural rubber, and neoprene. These were modified as little as possible so that the relation between adhesive and adherend would be due to the simplest possible combination. The adherends chosen, aluminum alloy, stainless steel, paper phenolic laminate, plate glass, birch wood, and hard rubber, are a fair sampling of the materials of industry, have a wide range of elastic moduli—the property best correlated with bond shear strength—and their chemical and physical structure make possible a variety of adhesive bonds.

Metal-tensile adhesion specimen being positioned in a universal hydraulic testing machine prior to testing under controlled conditions of temperature and relative humidity. Similar specimens were prepared from glass, wood and hard rubber adherends.

Shear strengths of adhesive-adherend combinations were determined on the universal hydraulic testing machine using double-lap-joint specimens. After placing specimen in the self-aligning grips, the machine was adjusted to load the specimen at a rate necessary to reach maximum load in about 3 minutes.

Test specimens were prepared using each adhesive in turn with each adherend; only one adherend was used in any one specimen. The proper treatment of the adherend surfaces was found to be of primary importance since, when exposed to ordinary atmospheric conditions, they usually pick up impurities in the form of oxide, dust, or oil films. If dirt or impurities are present, close contact between the adhesive and the base adherend surface is prevented and the best adhesive action is not obtained.

Prior to preparation of metal-adherend specimens, the surfaces were cleaned of oil and grease by rinsing in volatile organic solvents followed by pickling in acid to remove any loose oxide film. The glass surfaces were prepared by soaking in a sodium dichromate-sulfuric acid solution, then rinsing with water. Birch wood, phenolic laminate, and hard rubber were sanded with No. 00 sandpaper.

Specific bonding conditions for the test assemblies were developed for each adhesive, depending on the chemical and physical nature of the adherend. These conditions ranged from 3 lb/in.^{2} pressure, for a gum arabic adhesive, dried 20 hours at 25°C, to 150 to 200 lb/in.^{2} pressure, for a rubber adhesive cured 7 hours at 140°C.

The specimens, after conditioning for a minimum period of seven days at a temperature of 25°C and 50 percent relative humidity, were tested at the same temperature and humidity for shear, tension, impact, and fatigue properties. All combinations were subjected to the shear and tensile tests. The impact test provided a means for studying differences between a brittle and a rubbery bond, and the fatigue test was utilized to investigate how a thermosetting and a thermoplastic bond differ.

Except for glass specimens bonded with polyvinyl acetate and cellulose nitrate, a tensile shear load, applied to a double-lap-joint specimen, was used in every case for the shear-strength determinations. Glass proved too brittle when subjected to tensile-shear loads of more than 200 to 300 pounds per square inch. However, compression-shear specimens were able to withstand loads of more than 2500 pounds per square inch.

Tensile-adhesion values were obtained by using dumbbell-shaped specimens *(3)* with contact areas of one square inch, one-half square inch, and one-fourth square inch. When the adherends were much weaker than the adhesives, dumbbell-shaped specimens with the smaller contact areas were prepared in order that the specimens would fail at or near the bond interface.

The rate of loading in both the shear and tensile tests was adjusted within the limits of 200 to 1000 lb per minute so that failure of the bond would occur after approximately three minutes. Thus the time of fatigue would be about the same for all specimens.

The fatigue properties of thermoplastic and thermosetting resins were studied by using a double-lap tensile-shear specimen with a one-half inch overlap. By varying the width of such specimens—to which a 50 or 100 lb weight was attached—a range of shear stresses from 200 to 1300 lb was obtained. Impact-resisting properties of rubbery and brittle cements were compared, using single-lap specimens of both aluminum alloy and wood. These specimens were broken with a pendulum impact machine of 2 foot-lb capacity.

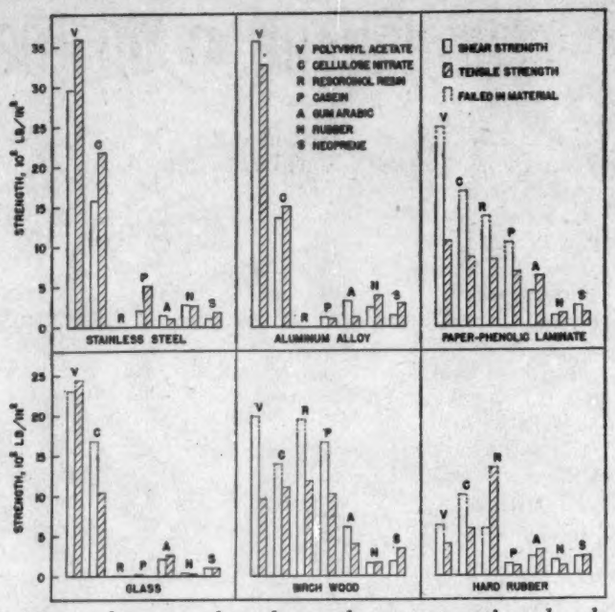
An evaluation of the data gathered in this project was obtained by tabulating the results with respect to two fundamental properties of the materials involved. These are dielectric constant and modulus of elasticity, the former an electrical and the latter a mechanical property. The dielectric constant was considered to be of possible importance since most modern theories attempt to explain adhesion on the basis of electrical forces.

The tabulations tended to show greater correlation with the moduli of elasticity than with the dielectric constants. When a high-modulus adhesive was used with a high-modulus adherend, the bond strength was negligible. When a low-modulus material was used, its strength became the limiting factor in the strength of the bonded assembly. The best results were obtained when medium-modulus materials were used with each other or with high-modulus materials. For instance, resorcinol-formaldehyde, a high-modulus adhesive, provided no adhesive action with glass and metals, both of which are high-modulus adherends. However, it gave good results with wood, a medium-modulus adherend. Polyvinyl acetate, a medium-modulus adhesive, gave consistently good values with all the adherends.

Results of these investigations indicate that there are many variables involved in adhesion and that the breaking stress of a specimen is not always a measure of the adhesive-adherend bond strength. Instead it may be a measure of the cohesive strength of the adhesive or the adherend. A break at the adhesive-adherend interface, for example, may be attributed not so much to lack of adhesion as to the overshadowing effects of strains produced by temperature differentials or by adhesive layer shrinkage due to solvent evaporation.

Chemical action between the adhesive and the adherend may also result in loss of strength in the bond assembly. This may be due to the weakening of the adhesive or adherend because of the chemical action or it may be due to the formation of a weak chemical layer at the bond interface.

As already mentioned most present day theories relate adhesion to electrical forces. Such forces, which may



These bar graphs show the comparative bond strengths provided by various adhesives, grouped according to the adherends used in the investigation by the Bureau of Standards of adhesive-adherend systems.

arise from hydroxyl, acetyl, nitrate, and other polar groups, may be important in pure adhesion but they tend to become secondary in an actual bonded assembly where other variables are of prime importance. The electrical forces, nevertheless, are probably the basic forces of adhesion and are always present.

The problem therefore becomes one for which a means must be found to modify the other variables in order to make the fullest use of the basic attractive forces. For a more thorough study of adhesion, it is necessary to separate these variables, whether electrical or mechanical, and to study each one separately. The program at the National Bureau of Standards is being planned with this in mind. At present an attempt is being made to evaluate the importance of various polar groups by studying their heats of wetting properties.

LITERATURE REFERENCES

(1) NACA Technical Note No. 989, Survey of Adhesives and Adhesion, R. C. Rinker and G. M. Kline, National Bureau of Standards, Washington, D. C.

(2) NACA Technical Note No. 1863, Comparative Strengths of Some Adhesive-Adherend Systems, N. J. De Lollis, Nancy Rucker, and J. E. Wier.

(3) ASTM Committee D-14 on Adhesives: Tentative Method of Test for Tensile Properties of Adhesives, August 28, 1944.

Housing Foundation, Inc., Deep River, Conn., has introduced a new, **quick-action soldering tool,** designed for high-speed precision soldering. Called the Pres-To-Heat, the new unit is reported to complete the average soldering job in less than 2 seconds, starting with an absolutely cold tool. The unit itself is of plastic, and weighs only 4½ ounces.

Intended for large molding jobs, a new **plastic preheater** has been introduced by W. T. LaRose & Associates, Inc., Troy, N. Y. The new unit is compact in size, requiring only 27 x 34 inches of floor space, and is completely portable. It is rated at 10 k.w. output, or 6 to 7 pounds of compound per minute.

Rubber Chemistry Division, C. I. C., Meets at Hamilton, Ont., on June 10

AS PREVIOUSLY ANNOUNCED, a regional meeting of the Rubber Chemistry Division of the Chemical Institute of Canada will be held in Hamilton, Ontario, on Friday, June 10. The meeting will be held at the Royal Connaught Hotel and will feature the presentation of eight technical papers. In addition, the Division will hold its annual business meeting during the afternoon. The Division meeting will start at 9:00 A.M. and finish in the late afternoon. It is also planned to hold a dinner on the evening of June 10, with a prominent guest speaker.

A High Polymer Forum, under the auspices of the Chemical Institute of Canada, will also be held in Hamilton at McMaster University on June 9 and 10, and on Saturday, June 11, the Ontario Rubber Group will hold its annual outing and golf tournament. The Forum will feature a complete and diversified program covering the broad field of high polymers and high polymer experimental techniques. The C.I.C. will sponsor a dinner on the evening of June 9 at which Dr. Raymond M. Fuoss, Professor of Chemistry at Yale University, will speak on "Polyelectrolites, the Twilight Zone Between Synthetic and Naturally-Occurring Macromolecules." Further information on the Forum can be secured from Dr. J. S. Tapp, Polymer Corporation, Sarnia, Ontario.

American technologists are invited to attend both the High Polymer Forum and the meeting of the C.I.C. Rubber Chemistry Division. Abstracts of the eight papers scheduled for presentation at the Division meeting, together with their authors and company connections, follow:

ABSTRACTS OF PAPERS

Plasticity of Reclaimed Rubber. ***F. L. Kilbourne (Xylos Rubber Co., Akron 1, Ohio).***

Several well known methods of measuring plasticity of rubber or rubber compounds have been applied to typical reclaimed rubbers. The change in the plasticity of reclaimed rubber with storage has been followed using these methods. At the present time, there is no single type of plasticity measurement which supplies all of the information which might be desired on any given reclaim. The selection of a method of measuring plasticity will depend on the processing methods used for the reclaim in question in the consumer's factory.

Statistical Techniques in the Rubber Industry. ***W. H. Schmalz (Dominion Rubber Co., Ltd., Kitchener, Ontario).***

When data on processing or on products is subjected to control chart analysis it is frequently found that excessive variability is associated with one or more influencing variable factors. Suitable corrective measures can be arranged, especially if statistical sense is used to buttress "horse-sense." Properly designed experiments help in finding the correct answers, by gathering data suitable for the application of techniques such as correlation and analysis of variance. These methods can be used for interpreting routine data for analyzing special test data and for establishing specifications.

Thus, statistical methods provide the means for integrating specifications, production and inspection into a continuous chain. As better control of product quality is achieved by taking action based on information revealed by inspection data, it is possible to narrow specification limits.

Through selected examples this paper gives a description of how statistics can be used as a basis for action in the rubber industry. It shows how the maximum amount of reliable useful information relating to the influence of variable factors on processes or products may be accumulated with minimum expense.

The Evaluation of Flex Life and Heat Build-Up Properties of Elastomers. ***E. B. Storey (Polymer Corp., Ltd., Sarnia, Ont.).***

Linear correlations have been established between the state of cure, measured by the dynamic compression of the vulcanizate, and the flex life and heat build-up properties of the vulcanizate. These properties are measured for an experimental polymer, in the same recipe as that used for the reference polymer, and, by expressing the test value of the experimental polymer as a ratio of the value calculated for the reference polymer, for a vulcanizate of the same dynamic stiffness, independent indices for the two properties may be obtained. On this basis, the calculated indices have been found to be independent of the time of cure and values may be obtained for a limited quantity of an experimental polymer.

Elongation Hysteresis of Hevea and Synthetic Elastomers. ***M. Mooney and S. Black (U. S. Rubber Co., Passaic, N. J.).***

A hysteresis test has been developed which measures directly the energy loss per cycle of elongation. Six samples are stretched, like the spokes of a wheel, between a small disc and a large disc. The large disc is motor driven, and the small disc, mounted on a ball bearing, is displaced eccentrically with respect to the larger disc. In the elongation cycle which each sample undergoes with each revolution, the hysteresis causes an average force on the small disc which is normal to the eccentric displacement and is proportional to the energy loss per cycle. A lever and balance system makes it possible to measure this force continuously while the machine is running.

Measurements were made on gum stocks of Hevea and five commercial synthetic elastomers. Testing conditions included temperatures, T, of 0°, 35°, 70° and 105° C.; frequencies, f, of 5 and 50 cps.; mean elongations, e, of 50, 100 and 200 percent, and elongation amplitude, A, 25 per cent. Absolute hysteresis, H, (loss/cycle-(Amplitude)^2) at first decreases with increasing e and then flattens or goes through a minimum. Hysteresis decreases with increasing T. The temperature co-efficient between 0° and 35° is very large for Hycar. Hysteresis usually increases with f, but only slightly in most cases; and Hevea at e = 400% shows a reversal of frequency effect, which is presumably associated with crystallization effects. Under the same test conditions, the hysteresis of the synthetics is 10 to 20 times that of Hevea.

When the hysteresis data for all synthetic stocks at various temperatures are plotted against T — T_s, T_s being second order transition temperature of the respective elastomer, the data lie within a rather narrow band. From this it is concluded that the hysteresis of synthetic elastomers arises from the same molecular forces which cause hardening and embrittlement at and below T_s.

Some Recent Developments in Special-purpose Polymers. ***G. W. Flanagan (B. F. Goodrich Chemical Co., Cleveland, Ohio).***

The following developments in elastomeric polymers are of considerable interest and worthy of review at the present time:

Hycar P.A.—A series of polyacrylic esters offered recently by B. F. Goodrich Chemical Company which include polymers

similar to Lactoprene E.V. These polymers are intermediate between silicone rubbers and other previously available rubbers in heat resistance but superior to silicones in physical properties. Some data will be presented showing interesting physical properties of typical compounds. Data will include properties of all polymers in the series with discussion of advantages and disadvantages of this type of polymer.

Blends of Plastics and Rubbers—Some new data will be presented on the use of nitrile type rubbers to plasticize phenolic and vinyl resins. Some of the more recent commercial developments such as oleo margarine package material (vinyl-nitrile rubber) and General Electric Company's nitrile rubber-modified phenolic molding compound will be discussed.

Applications of Nitrile Rubber in the Paper Industry—Data gathered in our laboratories during the past year will be presented with reference to commercial operations.

Training for More Efficient Engineering and More Productive Supervision. ***D. H. Stevens (Goodyear Tire & Rubber Co., New Toronto, Ontario, Canada).***

The theme of this talk will deal with and explain the necessity, in both industry and business, for training of management personnel. The structure of the talk will cover the basic qualifications for good engineering and productive supervision. Management's responsibility for supplementing these basic qualifications with training for more efficient production and better human relations will be discussed in its many phases.

The subject of personal progress will be dealt with on the basis that a person's ability to get ahead in his job with an organization is largely determined by his ability to apply sound management principles, which result in more efficient production and improved human relations.

The major objective of "Management Training" for supervisory and engineering personnel will be summarized as follows: (A) Improved human relationships between supervisional management, engineering, and all other fields; (B) More effective presentation of improved production and engineering ideas; (C) Greater recognition of the responsibilities and obligations that must be accepted by both the engineer and the supervisor for the overall success of the organization.

Inadequacy of Laboratory Evaluation of Natural and Synthetic Rubbers. ***H. A. Braendle, H. C. Steffen and J. G. Dewender (Columbian Carbon Co., Brooklyn, N. Y.).***

The laboratory testing of natural rubber has long been recognized as giving a not too satisfactory forecast of the usefulness of the rubber. Test methods have been revised and new ones devised. The trend has, over the years, been toward dynamic forms of test. The inadequacy of laboratory testing was emphasized by the advent of the GR-S tire. Treads made of this polymer outwore and outperformed any forecast based on their physical properties in comparison with natural rubber. Thus, GR-S treads developing tensile strengths of the order of 2000 to 2500 pounds gave wear performance 85% to 100% that of natural rubber treads with tensile strengths of the order of 4000 lbs.

In the evaluation of the new synthetic—cold rubber—laboratory tests again failed to predict road performance. Columbian Laboratories decided to go back of the physical test methods and to duplicate, in so far as possible, factory processing conditions. To this end, 2-roll mill mixing with cooling water circulating has been abandoned. All tread mixing is now done in steam heated Banbury mixers.

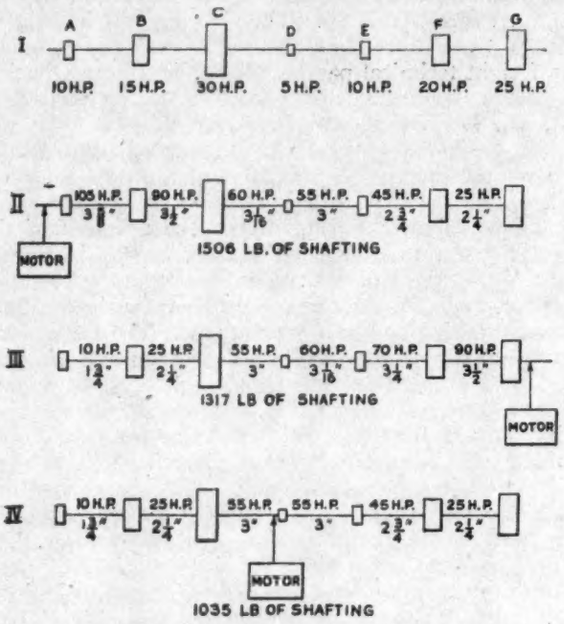
A new concept of the mechanism of polymer reinforcement by carbon black is evolving. It is believed that the next revision of laboratory test procedures must start in the mill room. It is quite probable that much time has been wasted on experimental polymers which did not come up to expectancy and that many good polymers have been discarded because their laboratory evaluation did not include a time-temperature history such as they must encounter in the factory.

Evaluation of Processability. ***N. R. Legge and S. T. Einhorn (Polymer Corp., Ltd., Sarnia, Ont.).***

Laboratory methods of evaluation of factory processability ratings of rubbers are reviewed critically in relation to the current theories of plasticity and elasticity. A method of evaluation based on determination of the magnitudes of the elastic and plastic components of deformation over a range of temperatures is proposed.

Most Economical Line Shaft for Rubber Factories

RUBBER factory operators know that there is always a best way in which to do most things, but the trick is to know that way. Take, for example, a line shaft drive. By driving it in the best way the cost of power and the cost of shafting can both be considerably reduced in many instances. It is accomplished by placing the driving motor or main driving pulley of a line shaft in the right place. The accompanying sketches show how this is done.



The pulleys on line shaft marked I are 10 feet apart. Pulley A will transmit 10 h.p.; B, 15; C, 30; D, 5; E, 10; F, 20; and G, 25, respectively, with a shaft speed of 200 r.p.m. The problem is to place the motor in the position that will require least weight of shafting and that will cause least power loss due to friction.

Sketch II shows the sizes of line shafts required between the pulleys to transmit the quantities of horsepower with the motor or driving pulley at the extreme left end. The minimum size of shaft is 2¼ inches at the right end and the maximum size is 3⅝ inches at the left end.

Sketch III shows the sizes of shafting required with the drive at the extreme right end. This time the minimum size of shaft is 1¾ inches and the maximum size is 3½ inches.

Sketch IV shows how to determine the correct position: Work inward from both ends and place the motor on the "maximum" size of shaft. The maximum size here is 3 inches.

Computing the weights of II, III, and IV, it will be found that with 10 feet between each pulley, 1506 pounds of line shafting will be required for line II, 1317 for line III, and 1035 for line IV. In other words, line II requires 45% more than line IV and line III requires 27% more than line IV.

Line IV will absorb least friction because the smaller the shaft the less the surface speed, and consequently the less the power loss.

Editorials . . . . . .

Science Foundation

UNLESS "must" legislation interferes, it is quite probable that a National Science Foundation will be created by Congress within the next several weeks. The Senate has already passed a Science Foundation bill and a special subcommittee of the House Interstate and Foreign Commerce Committee recently concluded public hearings. Administration circles are confident that the House committee will favorably report a bill whose major provisions will agree closely with the Senate bill (S-247), sponsored by Senator Thomas. Incidentally, the Senate passed a similar bill in 1948 and it failed of passage only because the House ignored the measure in the closing hours of its final session.

Space limitations do not permit a comprehensive analysis of the pending legislation but the numerous angles involved have all received thorough consideration at both open and closed meetings. In general, the American Chemical Society has put its stamp of approval on the Thomas bill with three major reservations: (1) The Society sees no necessity for the inclusion of special patent clauses in addition to those which now pertain to all government-financed research carried on under existing statutes; (2) It believes that funds to support research in the natural sciences and in the social sciences should not be administered by the same agency; (3) It believes the administrator should be selected by the Foundation or its executive committee.

As has already been pointed out by various technologists, there are two major dangers to be avoided in the operation of a National Science Foundation, namely, a tendency towards bureaucracy characteristic of most large government organizations entrusted with the expenditure of vast sums of money, and the possibility that after a few short years of operation all expenditures will be in the direction of applied research only. Although the pending legislation covers both fundamental and applied research, it is questionable whether non-technical legislators will continue to appropriate funds year after year for fundamental research without some concrete evidence of impending success. Yet, every technologist recognizes the impracticality of attempting to set specific time limits on fundamental research projects.

Although pending legislation will probably result in the early creation of the National Science Foundation there is violent objection to the Foundation in some circles. For example, the National Patent Council has voiced the opinion that "government control of research and invention will stifle individual incentive." One of its representatives testifying at the recent public hearing held by the House stated that "the foundation has been planned as a destructive instrumentality to be controlled by subversionists and employed to disable our industries."

Incidentally, in connection with the pending legislation, it is interesting to recall some statistics revealed in a survey by the *Wall Street Journal* last year. According to that survey, industry has already been replaced by government as the biggest financier for America's scientific research. Whereas before World War II the government footed about one-fifth of the nation's science bill it now pays well over one-half of that bill. Some 60 major government agencies have thousands of projects scattered through all the 48 states. The government owns and operates research facilities valued at some $1,500,000,000, not counting atomic development and production projects, which would double the figure. Some 30,000 scientists are directly employed by the government. The U. S. Treasury is currently supplying about $625,000,000 a year for research activities, with the bulk going to industry for government-sponsored projects. It is obvious that research is now big business.

Clever Merchandising

PROOF that carefully conceived and executed merchandising plans still pay off in profits is evident in the tremendous success of the "Amosandra" doll conceived and sold by the Sun Rubber Co. The brainchild of Thomas W. Smith, Jr., general manager of the company, the doll was "born" one night while Mr. Smith was listening to the popular radio team of Amos and Andy. He convinced the team of the merchandising possibilities involved if Ruby, Amos' wife, should have a new arrival, building up the situation over a period of months and tying it in with a running commentary calling attention to the current shortage of homes, hospitals and schools. This was done, and on February 20 the birth of "Amosandra" was announced on the radio program. One day later, on February 21, the "Amosandra" doll was put on sale in thousands of stores throughout the country. Here are some interesting facts: Sun invested over $100,000 before a single doll was shipped; some 250,000 dolls were shipped to stores before a single one was permitted to be sold; employment at the Sun plant in Barberton, Ohio, was boosted from 800 to over 1,200. Merchandising ideas still pay off.

CURRENT NEWS OF THE MONTH

HIGH POLYMER FORUM FEATURE OF SAN FRANCISCO MEETING

One of the features of the 115th meeting of the American Chemical Society held in San Francisco, Calif., the week of March 28, was the High Polymer Forum. The San Francisco forum was sponsored by the Division of Petroleum Chemistry with six other divisions, including the Rubber Division, and attracted a considerable amount of interest.

The general tone of the forum, according to *Chemical and Engineering News*, was that new and accurate experimental data on polymer systems indicates the need for considerable revision of the theories used during the past ten years. Introduction was made to certain tools relatively new in the study of polymers, such as sound waves, partition chromatography, and light scattering effects. Bruno H. Zimm, University of California, discussed the weight, extension, and distribution of polymer chains in dilute solutions as related to light scattering, viscosity, and osmotic pressure of the solutions and showed how these measurements aided in understanding the thermodynamic behavior of the solutions.

Data on Polystyrene Fractions

Experiments on the diffusion, sedimentation, and osmotic pressure behavior of several polystyrene fractions in different solvents, reported by Mrs. A. F. Schick of the California Institute of Technology, tended to verify the hypothesis of Beckmann, Singer, and others, that the only slight dependence of the diffusion rates of macromolecules in dilute solutions on the concentration is probably due to a thermodynamic effect tending to increase the diffusion rate and a hydrodynamic one always decreasing it, with increasing solute concentration.

Further studies of osmotic pressure of polystyrene solutions measured as a function of concentration and temperature were presented by Dr. Zimm, who found interesting discrepancies from the older theories of polymer solutions when entropies, heats of dilution, and other factors were calculated from the osmotic pressure data.

Transmission and attenuation of sound waves in high polymers were discussed by E. Guth of Notre Dame, with data reported on gum and tread rubbers over a considerable temperature and frequency range and results showing an increase of velocity with frequency and a decrease with temperature, leveling off at low temperatures. In regard to applications of partition chromatography, Marvin C. Brooks of the California Institute of Technology described its successful use for the first time in the fractionation of nitrocellulose with respect to molecular weight, by means of a column packed with swollen cellulose triacetate and developed with water-methyl acetate mixtures. Application of light scattering as a tool was covered by Robert H. Blaker, also of Cal Tech, in studying light scattering of nitrocellulose in solution in binary solvents as a means of investigating the interaction between nitrocellulose and plasticizers.

In a paper entitled "The Nature of Carbon Black Surfaces," W. D. Schaeffer, Godfrey L. Cabot, Inc., gave some good experimental data showing the interaction between carbon black surfaces and polymer chains. Robert B. Mesrobian, Polytechnic Institute of Brooklyn, presented two papers which gave a deeper insight into the field of hydrocarbon oxidation, particularly at low temperatures. In the first of these he concluded that at a given temperature the derived expression for the maximum steady rate of oxidation would predict that the rate at a given temperature depends upon the second power of the hydrocarbon concentration and is independent of the presence of an activator. In the second, dealing with the scission reaction, he found that the ratio of oxygen absorbed to chain cleavages is close to unity when a steady state of oxidation is reached but may reach as much as 30 to 1 under conditions of autoxidation.

Three studies of reactions in polymer systems, made at Brooklyn Poly, were presented by Dr. Herman Mark. One of these dealt with the dechlorination of vinyl chloride polymers with metallic zinc, giving new information regarding the reactions, their rates, and the type of structures involved. The authors' conclusions, as presented by Dr. Mark, were that the results obtained demand a major change either in the postulated character of the reaction or in the current picture of copolymer structure, and they favor the latter.

Rubber Head Protectors

New Jersey boxers will try out a new rubber head protector in the near future according to Abe J. Greene, athletic commissioner of the National Boxing Association. The protector consists of a thin coating of soft rubber over the eyebrows and ears, and a rubber cushion in back of the head. Wearing of the gear, Mr. Greene said, might protect fighters from formation of scar tissue, ear injuries and brain concussion. Current plans call for the use of the device in preliminary bouts in New Jersey. Trial use was approved recently by the NBA executive committee.

RECOGNITION OF SYNTHETIC STRESSED BY HARVEY FIRESTONE

World-wide recognition of American synthetic rubber production as a powerful, permanent factor in the international rubber market can be regarded as the most important direct result of the recent meeting of the International Rubber Study Group in London, according to a statement made on April 26 by Harvey S. Firestone, Jr., chairman of the Firestone Tire & Rubber Co. Mr. Firestone attended the meeting as one of the American delegates and took advantage of his trip to visit Firestone factories in England, Spain, Switzerland and Sweden.

"With this recognition," according to Mr. Firestone, "came acceptance of the fact that natural rubber no longer enjoys the position of an irreplaceable commodity which can be controlled by national monopoly or international cartel.

"Representatives of the natural rubber industry were deeply impressed when the United States disclosed the extent to which synthetic rubber has been adopted by rubber consuming industries. The American delegation took the position that some mandatory use of synthetic rubber in American-made passenger and light truck tires was required from the standpoint of national security, but actually a modification of this policy might have no appreciable effect upon the consumption of synthetic rubber, to the advantage of natural rubber. During 1948, for example, 170,000 tons of synthetic rubber were purchased by American manufacturers on a strictly voluntary basis."

More Recent Developments

Referring to developments achieved in the synthetic rubber industry since the end of World War II, Mr. Firestone emphasized the importance of the "cold rubber" development and predicted that this new polymer will replace standard GR-S wherever it is used in treads for small passenger car tires. Further, he stated, manufacturers will probably use "cold rubber" on a voluntary basis in place of natural rubber to improve the performance of the larger passenger car tire sizes.

"A similar trend also can be noted in the case of rubber latex," the Firestone executive continued. "The consumption of synthetic latex has continued at a high level notwithstanding the reduction that has taken place in the price of natural rubber latex, and the removal in May, 1948, of all restrictions regarding its use. Since low temperature GR-S latices show improved properties over the regular GR-S types, they may, to some extent, further replace natural rubber latices. Generally speaking, the outlook for GR-S latex is one of increasing use."

BENEFITS OF PRICE STABILITY TO RUBBER CONSUMER OUTLINED

The practical benefits of rubber price stability is the theme of the latest commentary on conditions in the rubber industry issued by P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co. The tenth in the series of "Notes on America's Rubber Industry," the report emphasizes the opinion that American users of tires and other rubber products have been saving about $100,000,000 every month because of the existence of our synthetic rubber industry.

Mr. Litchfield explains that from April 1, 1947, to the first of 1949, natural rubber available to this country was but 1,250,000 long tons. Total new rubber used during that period, however, has been 1,900,000 tons, of which 840,000 tons has been provided by the American-owned synthetic rubber industry. The disparity of 190,000 tons is accounted for by working stocks. Without synthetic then, there would have been an acute shortage of rubber.

This shortage, says Mr. Litchfield, would have excited active bidding for the available supply and the price would have shot up to one dollar a pound or more as against the current price of approximately 19 cents. Since the price of natural rubber has averaged only about 20 cents per pound during this period because of the stabilizing influence of synthetic rubber production, there is a clear saving of 80 cents per pound under what the short supply would have brought about.

This savings, money that otherwise would have come from the pockets of the American consumer, has reached a total of at least $2,000,000,000 since April 1, 1947, when the Government abandoned its controls of rubber and permitted a free market. Since that time, the price of natural rubber has ranged from under 14 cents to 25⅛ cents a pound. The 1948 average was 22 cents. In late 1948 and early 1949 the price has been relatively stable around 19 cents a pound, very close to the price-fixed level of 18½ cents a pound for American-made general purpose synthetic rubber.

Rubber Consumption Record

In each of the three full postwar years, 1946, 1947 and 1948, American consumption of new rubber, both natural and manufactured, has exceeded a million long tons. Another million ton year is expected in 1949. In the prewar years, synthetic rubber represented less than 1% of the total rubber consumed. In the three postwar years, synthetic rubber consumption has averaged 55% of the total, ranging from 73% in 1946 to 42% in 1948.

During the postwar period there has been a critical shortage of natural rubber. Only the availability of synthetic has enabled American manufacturers to meet the enormous demand for rubber products, said Mr. Litchfield. Natural rubber is now coming out of the Far East in increasing quantities but production is still short of world demand. World output reached about 1,515,000 tons in 1948 and is estimated at 1,665,000 tons in 1949, according to Mr. Litchfield.

Against this, world consumption of new rubber, both natural and synthetic, in 1948 was 1,900,000 tons and an almost equal tonnage is estimated for 1949. During the postwar years, as well as during the war, synthetic production has bridged the gap. Present annual plant capacity of at least 700,000 tons, mostly in the United States, remains an effective safeguard against any future shortages of natural rubber.

Conclusions to be Drawn

Mr. Litchfield states that if synthetic had not been available as a price stabilizer, the price of natural rubber might easily have soared to one dollar per pound after the return of the free rubber market on April 1, 1947. On the basis of about 1,250,000 tons of natural rubber imported into the United States since that date, the excess cost to the rubber industry and consumers would have been over $2,000,000,000.

Manufacturers, consumers and employees, all would have felt the burden of higher prices. Increased working capital would have been necessary and interest charges would have increased. The industry would have been forced to operate at reduced capacity instead of enjoying full capacity and employment during the period.

In the opinion of Mr. Litchfield, a severe black market would have existed due to the acute shortage of tires and other rubber products, resulting in still higher prices. Even at a price of one dollar per pound, little, if any, additional natural rubber would have been produced because there just wasn't any more available.

In view of the price stability which has been maintained, and in view of the continued natural rubber shortage, Mr. Litchfield recommends that 600,000 tons of general-purpose synthetic rubber plant capacity be kept in standby condition, ready for an emergency, and that at least 150,000 tons of this capacity be kept in constant production. Not only is this required by market conditions, but also because it will enable an ever growing fund of production know-how for the nation, he concluded.

Mineral Pigments Apointments

The establishment of a New England Sales office under the direction of M. J. Fenton has been announcd by the Mineral Pigments Corp., Muirkirk, Md. Mr. Fenton is well known to the rubber, plastic and allied industries throughout New England. The corporation intends to establish warehouse stocks of standard items in Boston, Mass. Another sales office in the Minneapolis-St. Paul, Minn., area has also been opened covering the North and South Dakota areas. E. Bushnell, formerly vice-president in charge of sales for General Finishes, Inc., has been named to head this office, which will also maintain warehouse stocks for the area it serves. Murray Kornbluth has joined the organization to take charge of production of chrome colors, iron blues, etc. Thomas Morris, formerly associated with Northern Pigments Corp., Toronto, Canada, has also been added to the corporation's staff to take charge of the production of synthetic yellow, red, brown and black iron oxide.

MECHANICAL PRODUCTION LINE AT HEWITT-ROBINS' RESTFOAM DIVISION

The photograph above depicts foam rubber pads for 1949 model automobiles moving through the new high-speed mechanical production line at Hewitt-Robins' Restfoam Division plant at Buffalo, N. Y. Foam pads move into drier at right following washing operation. The company has announced that the new line which was installed last fall has gone on a three-shift, six-day week basis to meet the rapidly increasing use of foam rubber for auto seating. The company is also turning out Restfoam mattresses, pillows, and cushioning for buses, trains and furniture.

ENGINEERING PROBLEMS IN RUBBER INDUSTRY FEATURE AIEE MEETING

A number of interesting and informative papers were presented at the second conference on electrical engineering problems in the rubber and plastics industry held on April 26 at the Hotel Portage in Akron, Ohio. The meeting was sponsored by the subcommittee on rubber and plastics industries of the American Institute of Electrical Engineers, in conjunction with the AIEE Akron Section.

In a paper on "Motor Requirements for Tuber Mill Drives," D. J. Rose of the Firestone Tire & Rubber Co., Akron, Ohio, commented that the range of products run on a single tuber requires a drive capable of operating over considerable speed range. Firestone has found that DC motors having necessary speed range by field control are proving best by reason of over-all economy and possession of characteristics closer to over-all requirements, he said.

Firestone, he added, has also found that attempts to use dies too small, relative to tuber size, result in rotation of body of stock in the barrel with the screw, slackening head pressure, and much of power input being concentrated on milling small quantities of stock between die and screw end, with temperature rises excessive.

Maximum production is obtained when dies permit operation with minimum slippage of stock on internal surfaces. Formula $HP = KD^3 (RPM) - D =$ barrel diameter in inches, RPM = screw speed, K = constant representing assigned limits of speed, plasticity and die size, with 0.03 satisfying most present requirements.

Meeting Drive Requirements

W. S. Watkins, Ohio Rubber Co., Willoughby, Ohio, in a paper on "The Application of Electric Motor Drives to Rubber Mills," stated that the variety of functions of the 2-roll mill requires that each application be carefully scrutinized in order to fulfill all of the drive requirements. If all of the factors which influence drive selection are listed in systematic form on a check-sheet, and all the possible alternatives and provisions are arranged on the check-sheet for evaluation and comparison, the danger of over-looking some important consideration will be minimized.

Data from existing installations should serve not to restrict but to expand the point of view, so that opportunities of providing better application by departing from tradition and convention are not over-looked, Mr. Watkins added.

The problem of motor selection for calenders is amplified by the great variety of calender sizes and calender processes, said V. O. Johnson, U. S. Rubber Co., New York, N. Y., in a paper entitled "Motor Drives for Calenders." The motor rating should be based on the worst condition to be expected in normal operation. The maximum power requirement for any given calender process may be shown in graphical form as a function of speed, he said. Motor and gear rating computations may be made and shown graphically as a function of speed. Adjustable voltage ratings bear a closer relation to gear ratings and calender loads than do constant voltage ratings.

The problem of braking and safety stops requires attention to details of construction and location of safety switches and other safety features of a calender. The measurement of stopping distances of calenders or mills may be simplified by the use of a new instrument with an accuracy of $\pm$ 0.1 inch. The instrument is very useful to engineering departments for checking the results of adjustments intended to improve the stopping distance, the speaker noted.

In a paper on "Motor Drives for Banbury Mixers," T. W. Millea of the Farrel-Birmingham Co., Inc., Ansonia, Conn., recommended Banbury Mixer electrical specifications, and commented on the various types of motors, horsepower requirements, braking and controls. He also offered suggestions for operation.

The speaker concluded that breakdowns are costly, and users of Banbury Mixers were urged to procure adequate electrical equipment even though the initial investment may be greater. He also observed that all equipment, including motors, mixers, and controls have limitations, and that this equipment should be utilized within these limitations and for the job for which they were intended.

J.I.C. Electrical Standards

Thomas C. Jones, National Rubber Machinery Co., Akron 8, Ohio, in a paper entitled "Joint Industrial Conference Standards for Industrial Equipment, as Viewed by an Equipment Manufacturer," discussed J.I.C. Electrical Standards as applied to the rubber and plastics industry. Mr. Jones observed that to adopt these standards it has been estimated that the selling price on certain types of equipment would have to be increased approximately 5% to maintain normal profit. Until the industry as a whole accepts these standards, equipment manufacturers must be cautious in accepting J.I.C. standards, until a definite trend can be foreseen, he said.

Mr. Jones said that there is another side to this problem, namely, users should receive definite improvements over present electrical construction methods to warrant the additional cost. The buyer will receive equipment which will be engineered to provide complete technical data on the operation and maintenance, improved types of enclosures, conduits, and wiring accessories, which will insure longer life, accessability, and pleasing appearance of the equipment.

Other papers presented at the conference included:

Motor Requirements for Motor Mill Drives, by R. S. Ferguson, Goodyear Tire & Rubber Co., Akron, Ohio.

Preventive Maintenance of Rotating Equipment in a Rubber Plant, by T. F. Duffy, U. S. Rubber Co., New York, N. Y.

Joint Industry Conference Standards for Industrial Equipment-User's Viewpoint, by F. L. Swanson, U. S. Rubber Co., Detroit, Mich.

Joint Industry Conference Standards for Industrial Equipment-User's Viewpoint, by L. J. Willmott, Willmott Electrical Co., Akron, Ohio.

Norwalk Awaits Court Action

There have been several developments in the affairs of the Norwalk Tire & Rubber Co. in the past few weeks. Walter A. Krappe, vice-president, disclosed on April 25 that Elliott E. Simpson, one of the company's major stockholders, had withdrawn his request for a special meeting of stockholders for May 3 for the purpose of electing a new board of directors. At the same time, Mr. Krappe announced that Norwalk Tire has terminated an arrangement under which the L. Drexsage Co., a firm controlled by Mr. Simpson and his family, had been the selling agent for footwear products made by the company.

The show-cause action brought by the T. A. Maguire Co., also controlled by Mr. Simpson, in the Superior Court at Bridgeport, Conn., which sought an injunction restraining Norwalk Tire from increasing its capital stock or mortgaging its property, as well as a judgment declaring void the elections of directors, was dropped on April 12, after Norwalk Tire's management agreed not to institute bankruptcy or other reorganization proceedings.

The legal action brought by Mr. Simpson to determine the validity of the company's annual meeting of January 17, 1949, at which the present board of directors was elected, was scheduled to proceed in the courts on May 10. Mr. Simpson has also requested the company to call a special meeting of stockholders on May 16 to consider such matters as the decree of the court may authorize or permit. On May 7, it was announced that a committee had been formed to represent holders of the 4% convertible debentures due on April 5, 1958.

Issue 1949 TLARGI Year Book

The Los Angeles Rubber Group, Inc., has published the 1949 edition of its TLARGI Year Book. Like previous editions it contains a complete roster of the group's membership, sections listing rubber manufacturers in the Pacific Coast area and suppliers of rubber chemicals and compounding ingredients serving that area, as well as an illustrated chronological history of the group's activities in the previous year. In addition, some valuable technical data is furnished, including physical test specifications for various types of rubber, solubilities of unvulcanized elastomers, and a glossary of accelerators and antioxidants. Regulations pertaining to the handling of dangerous chemicals in the Los Angeles area are included, as is a handy hardness conversion chart.

Named Exclusive Sales Agents

The Rubber Corporation of America, 274 Ten Eyck St., Brooklyn 6, N. Y., has been appointed exclusive sales agents for the natural rubber latex and latex concentrates produced by N. V. Rubber Cultuur Maatschappij "Amsterdam" of Amsterdam, Holland. RCMA latex and latex concentrates are produced by the Holland concern on rubber estates owned and operated in Sumatra. The Rubber Corporation of America advises that 61-63% RCMA centrifuged latex is currently available in bulk and in drums.

ADDITIONAL RUBBER EQUIPMENT NEEDED BY WAYNE UNIVERSITY

Through a cooperative plan, the Detroit Rubber & Plastics Group and the Detroit Section of the Society of Plastics Engineers have made it possible for Wayne University in Detroit to establish a laboratory on its campus as a center for research and training facilities in the Detroit area. The equipment, consisting of laboratory mills, curing ovens, calender, laboratory glassware, etc., has been furnished by the two sponsoring groups.

During the war, the University was able to train a large number of students in the rubber and plastics field through these facilities. Since the war, the laboratory has been used for regular university courses in high polymer work and in special problems of a research nature. However, in order to serve adequately its dual function of training and research, the laboratory needs additional rubber and plastics equipment and a new campaign is being launched by the two sponsoring technical groups to secure such equipment.

One major reason for the need of the additional equipment at present is the fact that Wayne University now has under construction a new Engineering Laboratory Building and it is planned to house the rubber and plastics laboratory in the new unit. According to present plans, the laboratory will occupy about 5,000 square feet of space in the new building.

Technical Group Activities

The activities of the Detroit Rubber Group and the Detroit Section of the Society of the Plastics Industry also includes the distribution of books related to rubber and plastics. To date, approximately 1,700 books of a technical nature have been distributed to schools and colleges in the Detroit area. The majority of these books were donated by the Goodyear Tire & Rubber Co. and the R. T. Vanderbilt Co. A reference library of technical literature also has been established at the rubber and plastics laboratory at Wayne University.

Some of the materials preparation equipment still needed at the rubber laboratory include a rotap sieve shaker, a set of 4 to 200-mesh screens, a stainless steel autoclave, a glass-lined kettle, a Cumberland granulator, a Micropulverizer, a Di Mattia plastics scrap grinder, a laboratory size colloid mill, and a Sigma bar mixer.

A rubber mill (8" x 18") is also needed, as is a 4-pound capacity Banbury Mixer, and a Banbury "00" Pony Mixer. Processing equipment needed includes a vacuum drier for resins, a long barrel plastics extruder, a coating spreader, a Farrel-Birmingham 4-roll calender with 12" x 30" rolls, etc.

Curing equipment, including compression presses, testing equipment of all types, as well as general laboratory equipment are also needed for the rubber laboratory expansion.

Companies or individuals in the rubber field desiring to contribute either machinery or equipment or cash to the Wayne University project are asked to contact Ed Kvet, Baldwin Rubber Co., Pontiac, Mich., the secretary-treasurer of the Detroit Rubber & Plastics Group.

Rossman Joins Cabot Staff

Ray P. Rossman

Ray P. Rossman, formerly manager of the Southwestern rubber testing laboratories for the Cabot Carbon Co., Pampa, Texas, has been assigned to the technical service staff of Godfrey L. Cabot, Inc., Boston, Mass. He will act as technical liaison representative between customers and the Cabot carbon black manufacturing operations from headquarters in Pampa. A graduate of the South Dakota State School of Mines and Technology in 1934, Mr. Rossman received a B.S. degree in Chemical Engineering. He received his Masters degree in physical chemistry in 1936 at the Massachusetts Institute of Technology. Since coming to the Cabot organization in 1937, Mr. Rossman has been actively engaged in carbon black problems, including fundamental research work on carbon black as a reinforcing pigment and in rubber compounding development. In 1944 he was placed in charge of the rubber compounding and testing group of the Boston laboratory, and in July, 1946, was transferred to Pampa as manager of the Southwestern rubber testing laboratories.

Bingham Named Sales Agents

U. S. Rubber Co. has appointed Bingham Brothers Co. as exclusive sales distributor for all synthetic rubber inking rolls manufactured for the graphic arts industry by U. S. Rubber. Bingham services the printing industry in 17 states along the eastern seaboard. It operates four composition roller plants in Philadelphia, Penna., New York, N. Y., Baltimore, Md., and Rochester, N. Y. The company maintains sales offices and representatives in all principal eastern cities. For the past two years U. S. Rubber and Bingham have worked in close cooperation, field testing newly developed synthetic rubber inking rollers. U. S. Rubber is enlarging and streamlining the synthetic rubber roller production facilities at its plant in Providence, R. I.

AKRON KNOW-HOW SETS WORLD RUBBER PATTERN SAYS O'NEIL

"Akron know-how sets the pattern for the rubber industry—not only in the United States, but for the entire world," said William O'Neil, president of the General Tire & Rubber Co., in his talk to General's foreign factory managers' conference held recently in Akron, Ohio. Mr. O'Neil recently returned from a five-week business trip to Europe.

Akron companies control 50% of the rubber business outside of the United States. Therefore most of the world is dependent upon rubber development from this city. Thus far we have met every transportation problem that has developed, and in most instances the Akron developments have brought travel advancements," he said.

Mr. O'Neil assured his listeners that every problem known to the tire industry had come under the scrutiny of Akron's chemists and engineers. "In the United States, we have encountered problems as varied as any in the world. We have to know something about rubber and tire manufacturing to cope with such variable conditions."

Much of the credit for the tremendous development in synthetic rubber is the result of Akron know-how, Mr. O'Neil affirmed. "Our industry has invested more than $25,000,000 in research facilities and almost every day they are producing new and challenging things. The rubber growers who attended the recent Sixth International Rubber Study Conference in London were surprised and somewhat panicky that such progress has been made in the man-made rubber world," he noted.

The General Tire foreign managers attending the conference participated in a rubber seminar. They were brought up to date on compounding and heat engineering developments, field engineering problems, tire construction and developments, and plant efficiency methods. The foreign managers also reviewed their programs and progress.

Calco Consolidates Services

Consolidation of research, process development and dyes technical service into a single department has been announced by the Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J. The new department will be known as the Research and Development Department and will be under the direction of K. H. Klipstein, assistant general manager of the Calco Chemical Division. It was also announced that Dr. H. Z. Lecher, associate director of research for the division since 1938, has been named director of research. A native of Vienna, Dr. Lecher played a leading role in the development of the buna rubbers at the I. G. Farben laboratories at Leverkusen, Germany. He came to the United States in 1932 to direct the research on dyes at Calco. Dr. M. L. Crossly, under whose direction Calco's research department has been expanded to its present status, is retiring in August, but will act as special consultant to S. C. Moody, vice-president and general manager of Calco Chemical.

HOUWINK AND LOCKWOOD ADDRESS AKRON GROUP ON RUBBER ROADS

Approximately 300 members and guests of the Akron Rubber Group attended the spring meeting held on April 15, at the Hotel Mayflower, in Akron, Ohio. Principal speakers of the evening were Dr. R. Houwink, Director General of the Rubber Foundation, Delft, Holland, and Warren S. Lockwood, director of the Rubber Development Bureau, Washington, D. C. Dr. Houwink spoke on the subject "Rubber in Road Construction," while Mr. Lockwood addressed the group on the current rubber situation.

Prior to the talks, a short business meeting was held at which the results of the letter ballot for 1949-50 officers were announced. The new officers are: *Chairman*, C. A. Ritchie (Goodrich); *Vice-Chairman*, E. L. Stangor (DuPont); *Secretary*, D. F. Behney (Goodyear). An amendment to the by-laws of the group calling for payment of definite dues as a requirement of membership was passed by a four to one majority. It was also announced that the summer outing will be held on June 17 at a country club in the Akron area.

In his preliminary talk on the rubber situation, Mr. Lockwood was sharply critical of the State Department's attitude toward the Netherlands Indies. He pointed out that one of the surest ways of preventing the inevitable oversupply of natural rubber from becoming a serious world problem was to develop new uses for the material.

It was in this connection that the speaker revealed that arrangements are being completed with state highway departments in Texas, Virginia and Ohio for the construction of mile-long test strips of rubber containing road surfaces in each state. Mr. Lockwood said that rubber producers view the development of the use of rubber in road surfacing compounds as the greatest potential outlet which can presently be visualized.

Rubber Road Construction

In his talk, Dr. Houwink described rubber road construction, the manner of making installations, and gave visual proof of the way in which such roads have held up during years of service. During this portion of his address, the speaker illustrated his points with slides, motion pictures and free-hand drawings. He explained that it is a popular misconception for people to think of rubber roads as being something like a rubber floor. This is not the case.

Dr. Houwink then described the manner in which rubber, in the form of powder, is added to a mixture of molten bitumen and fine aggregate such as is normally used in asphalt road construction in this country. The resulting compound is used only as a top surface coat and not through the entire thickness of the road.

In constructing this type of road, a foundation of coarse stone, topped by finer stone is first put down. This is covered by the usual road base of stone chips and liquid bitumen. On top of this layer goes a surface layer consisting of liquid bitumen and fine filler plus approximately 5% of rubber powder based on the bitumen. The powder used in this work is made by spraying latex containing an anti-sticking substance into a current of warm air.

Dr. Houwink explained that the rubber powder slowly adsorbs the volatile constituents of the bitumen and swells to about five times its original volume. This produces a system in which swollen rubber is dispersed in bitumen having greater hardness than the original bitumen. The result is that the road is dry and firm, is less soft, and has less flow than conventional asphalt in summer.

The presence of the rubber materially increases impact strength and also makes the road less hard in winter. As a consequence, the road surface lasts longer, the foundation is protected from moisture penetration and freezing, cost of upkeep is lower, there is less interference with traffic because of repair work, and the road surface is less dusty. The road is also somewhat less noisy and appears to offer greater resistance to skidding.

Previous Rubber Roads

The speaker exhibited photographs taken recently in Holland of test strips containing rubber powder, and adjacent control strips containing no rubber. The photographs indicated the marked superiority of the rubber-asphalt combination. Dr. Houwink pointed out that these roads had been subjected to severe service by military vehicles during the war and had had little maintenance.

The equally fine performance of this road material in the tropics was cited by Dr. Houwink as an example of its versatility under a wide range of temperature and climatic conditions. The highway he referred to is that between Buitenzorg and Batavia, Java, which is in excellent condition despite having carried the heavy traffic of both the Japanese and Allied armies during and after the war.

Dr. Houwink was accompanied to this country by F. T. Bokma, prominent Dutch road engineer, who has supervised the installation of several test roads in Holland. Mr. Bokma will work with highway officials in the three states designated for the construction of test road strips.

Hewitt-Robins has started production of a new type wire wheel brush for use where buffing with a wire brush is a part of operations. The new brush employs a rubber hub instead of the conventional wood or metal center.

Water Capacity of Hose

The Department of Agriculture has released figures on the water capacity of garden hose. Of interest to home owners planning a water system, as well as in case of a home fire emergency, the figures indicate that a ½-inch hose with nozzle will deliver 200 gallons of water an hour, a ¾-inch hose with nozzle will deliver about 275 to 300 gallons of water an hour, and a lawn sprinkler head will put forth approximately 120 gallons of water in an hour.

LONDON CONFERENCE ON RUBBER TERMED "WASHOUT" BY DUTCH

Dutch rubber quarters in Amsterdam are of the opinion that the recent conference of the Rubber Study Group in London, England, was a "complete washout," according to information recently received in this country. The price for rubber, according to producers, is decidedly too low, especially for holders of small plantations. The latter in many instances throughout Southeast Asia have given up their rice fields and are now almost entirely dependent on rubber, while rice must be purchased at exorbitant prices.

A shortage of rice has been predicted, and this, according to rubber quarters, will create serious dangers which menace not only the rubber interests themselves, but also all those persons in Southeast Asia who directly or indirectly are dependent on rubber.

The Rubber Study Group's conference was attended by 15 delegations. In its press releases, hardly any mention was made of the price of rubber. The group is in line with the International Trade Organization which in its charter provides for the possibility of establishing study groups also in behalf of attaining "prices that are fair to consumers and provide reasonable returns to producers." Moreover, the establishment of such prices is regarded as in line with President Truman's Point 4 of his inaugural address, in behalf of undeveloped countries.

Dutch and other rubber producers were dumbfounded that in view of the aims of study groups, the rubber group confined itself to "listening to some national statements" instead of tackling the price problem. They particularly ask whether the attitude of some members of the American delegation was in line with the principles of the ITO charter and President Truman's Point 4.

Finally, the Dutch producers hold that a solution of the price problem could easily be found by America holding strictly to the 220,000 tons of synthetic rubber provided in the Rubber Act of 1948 instead of the present 450,000 ton output. Such curtailment, they maintain, would cause a slight shortage of natural rubber which would automatically tend to raise prices.

No. California Hears Miller

The March meeting of the Northern California Rubber Group held at the Hotel Claremont, in Berkeley, Calif., on March 31, was addressed by Robert D. Miller, chief electrical engineer of the U. S. Naval Shipyard in San Francisco, Calif. Mr. Miller spoke on "Atomic Energy and the Atomic Bomb." The speaker was an eyewitness at the Bikini tests, and was able to convey to his audience the vividness of the explosions, as well as the preparations and the results. At the conclusion of his talk, the speaker showed the official Army-Navy color sound movies of the tests. The next meeting of the group is scheduled for April 28 at which time Dr. F. M. McMillen of the Shell Development Co. will speak on "Experiments with the Extension of Cold Rubber by the Use of Plasticizers and Carbon Black."

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JOINT BUFFALO-ONTARIO MEETING FEATURES ADDRESS BY DINSMORE

The annual joint meeting of the Buffalo and Ontario Rubber Groups was held this year on May 6 at the General Brock Hotel, in Niagara Falls, Ontario, Canada. Featured speaker of the session was Dr. R. P. Dinsmore, vice-president in charge of research and development of the Goodyear Tire & Rubber Co. Dr. Dinsmore spoke on the subject "Cold and Hot Rubber."

Problems in the use of cold rubber in tire manufacture and untapped potentials for conventional synthetic rubber as a road paving material were discussed by the speaker. The advent of cold rubber, while stimulating to rubber technicians, has created considerable confusion among these technologists and laymen alike, partly because of the varying opinions as to the actual quality characteristics of the material, Dr. Dinsmore said.

"In spite of tread-wear possibilities equal to or better than those of natural rubber, popular antagonism towards increased cold-weather skidding and hot weather cracking make it essential to be certain of these characteristics before there will be much pressure towards replacement of natural rubber in that part of the tire which contacts the road," the speaker said.

Summarizing his position on cold rubber possibilities, Dr. Dinsmore noted that the material "like regular GR-S, requires carbon black loading to have sufficient toughness even for carcass stocks. Thus, even though it is more resilient than the old GR-S, this improvement is not sufficient to overcome the handicap caused by the use of black, especially for large tires."

As for the use of synthetic as a component in rubber-asphalt combinations, Dr. Dinsmore noted that this combination will prove equal or better at normal temperatures, and that the temperature range of effective durability will be considerably extended. In a review of his company's experimental work on rubber-asphalt paving, the speaker said that initial tests were made in 1947 after P. W. Litchfield, Goodyear board chairman, had seen work of the Netherlands Government on several sections of road treated with rubber-asphalt.

Goodyear's first tests were made with both natural and synthetic rubber powders and were applied as thin top finish coats comparable to those placed on the Netherlands roads. In an agreement with the City of Akron, Goodyear placed more than a mile of rubber-asphalt paving down on a main thoroughfare last year.

In part of the rubber mixture, 5% of rubber, based on the weight on asphalt, was used; and in the remainder 7½% was used. Rubber made from GR-S latex was used throughout. Tests were made on penetration, softening point, ductility, and the effect of freezing weather on possible shattering, all with positive results, indicating that the tests were moving in the right direction, Dr. Dinsmore said.

Bristol Manufacturing Co., Bristol, R. I., has been awarded a Navy contract for the manufacture of 93,000 pairs of men's rubber overshoes.

Coming Events

May 20. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

May 21. Southern Ohio Rubber Group. (Tentative).

May 23-25. Rubber Division, A. C. S., Statler Hotel, Boston, Mass.

May 26. Northern California Rubber Group, Claremont Hotel, Berkeley, Calif.

June 4. Southern Ohio Rubber Group, Outing, Edelweiss Park, Dayton Ohio.

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June 6-8. Twenty-Third National Colloid Symposium, Division of Colloid Chemistry, A.C.S., University of Minnesota, Minneapolis, Minn.

June 7. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

June 16. New York Rubber Group, Outing, Doerr's Grove, Millburn, N. J.

June 17. Akron Rubber Group, Outing.

June 24. Detroit Rubber Group, Outing, Golf Tournament.

June 24. Boston Rubber Group, Outing, United Shoe Country Club, Beverly, Mass.

July 9. Chicago Rubber Group, Outing, Andrews Country Club, Gary, Ind.

July 23-24. Los Angeles Rubber Group, Outing, Catalina Island, Calif.

July 30. Buffalo Rubber Group, Outing, Lancaster Country Club, Buffalo, N. Y.

Sept. 18-23. American Chemical Society, 116th National Meeting, Atlantic City, N. J.

Sept. 22. Southern Ohio Rubber Group. Engineer's Club, Dayton, Ohio.

Oct. 7. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 10-14. A.S.T.M., West Coast Meeting, Fairmont Hotel, San Francisco, Calif.

Oct. 14. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Oct. 21. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Oct. 24-28. 37th National Safety Congress and Exposition, Chicago, Ill.

Dec. 9. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Dec. 10. Southern Ohio Rubber Group, Miami Valley Golf Club, Dayton, Ohio.

Dec. 15. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Dec. 16. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Southern Ohio Meeting Dates

The Southern Ohio Rubber Group has established the following meeting dates for 1949: Summer Outing, June 4, at Edelweiss Park, Dayton, with R. R. Hickernell as chairman of the outing and R. B. Sucher as golf chairman; Technical Meeting, September 22, at the Engineer's Club, Dayton, with Harold Kenney as chairman; Christmas Meeting, December 10, Miami Valley Golf Club, Dayton, with George E. Lang as chairman.

NORTHERN CALIFORNIA HEARS McMILLAN ON COLD RUBBER

The April 28 meeting of the Northern California Rubber Group, held at the Hotel Claremont, in Berkeley, Calif., was addressed by Dr. Frank M. McMillan, manager of the Rubber Laboratory, Shell Development Co., Emeryville, Calif. The subject of Dr. McMillan's address was "Some Experiments on Extending Cold Rubber Tread Stocks with Carbon Black and Petroleum Plasticizers."

Dr. McMillan illustrated his talk with graphs showing the comparative physical properties of stocks which had been extended varying amounts with carbon black and heavy petroleum softeners. The speaker also exhibited photographs of road tested tires made of the various stocks. A question-and-answer period followed Dr. McMillan's address.

The meeting was attended by a large number of guests including a group from the Federal Natural Rubber Research Laboratory at Salinas, Calif., and Charles Churchill, of the Sterling Rubber Products Co., president of the Los Angeles Rubber Group.

Washington Group Hears Houwink

The April 26 meeting of the Washington Rubber Group held at the Cosmos Club, Washington, D. C., was addressed by Dr. R. Houwink, Director General of the Rubber Foundation, Delft, Netherlands. Dr. Houwink spoke on the subject "Rubber in Road Construction." His address was similar to one delivered before the Akron Rubber Group which is reported upon in some detail elsewhere in this issue. The nomination of officers for the 1949-50 season was another feature of the meeting. The meeting of May 24 will be addressed by Dr. L. G. Polhamus, of the Department of Agriculture, Plant Industry Station, Beltsville, Md. His subject will be "Natural Rubber Development in the Western Hemisphere."

Goodrich Income Reported Off

Sales of the B. F. Goodrich Co. for the first quarter of 1949 were about one per cent under the first quarter of last year, according to the report made by John L. Collyer, president, to the annual meeting of stockholders held in New York on April 19. Net income was lower due to higher costs and lower selling prices. Mr. Collyer also indicated that the backlog demand accumulated during the war years has now been fully satisfied and industry sales of rubber products will henceforth depend on current needs.

Rhode Island Spring Meeting

The Spring Meeting of the Rhode Island Rubber Group, held on April 21 at the Metacomet Golf Club, East Providence, R. I., was attended by approximately 100 members and guests. Dr. Charles H. Smiley, Professor of Astronomy and Director of Ladd Observatory, Brown University, became ill during his scheduled address and was forced to retire.

DETROIT HEARS WIARD DISCUSS SILASTIC PROPERTIES AND USES

The Detroit Rubber and Plastics Group meeting held on May 6 at the Detroit-Leland Hotel, Detroit, Mich., featured an address by W. A. Wiard of the Dow Corning Corp., Midland, Mich. Mr. Wiard spoke on "Silastic—Its Properties and Place Among Synthetic Rubbers." His talk was opened with a brief resume of the early history of the silicones and of their introduction into this country. The chemistry of the silicones was discussed, and one of the chemical methods of preparation involving the Grignard reagent was described.

With the aid of slides, Mr. Wiard showed the nature of the equipment necessary to produce silicones. There followed a short discussion of the basic properties of the fundamental groups of commercial products. Slides were again used to illustrate the basic properties of silicone rubber, and the unusual temperature stability of this elastomer was demonstrated by burying one end of a continuous extrusion in dry ice and the other end across a hot plate at approximately 600° F. Towards the end of the talk, knots were quickly tied in both ends of this extrusion to demonstrate that neither heat nor cold had effected it perceptibly.

Mr. Wiard discussed the commercial applications of Silastic and offered many different fabricated items for the inspection of the group members. Aircraft heating ducts, covered wire, molded and stamped gaskets, and miscellaneous molded and extruded small parts were shown. A new and different type of Silastic which is said to exhibit greater tensile, elongation and resistance to abrasion was also offered for inspection by Mr. Wiard.

Approve Neoprene-Jacketed Cable

Underwriters' Laboratories, Inc., has completed an investigation and has authorized label service on a service entrance cable, Type SE, which employs a neoprene jacket as the final outer covering in place of the conventional fibrous outer covering. The use of a neoprene jacket as the outer covering for a service cable is not new in principle, since such jackets have been accepted as the final outer covering of Type USE underground service entrance cables for some time. However, neoprene has not previously been recognized as the final outer covering of cables that are used above ground where exposed to direct sunlight and the weather.

Correction on Plasticizer SC

The price of Plasticizer SC, manufactured by E. F. Drew & Co., Inc., shown on Page 106 of our April, 1949, issue was erroneously listed as 36 to 38c per pound. The correct price of this product is 49c per pound tank cars, 50c per pound carload drums, and 52c per pound less carload. Occurrence of the error is regretted and we take this means of calling it to the attention of our readers.

Daisy Bumstead Novelty

The latest rubber novelty introduced to the toy field is a reproduction of Daisy Bumstead, the lovable dog of Dagwood and Blondie comic strip, movie and radio fame. Developed and sold by the Comic Toy Manufacturing Corp., 537 West 53rd

St., New York 19, N. Y., Daisy is made with a grey latex skin and is stuffed with foam sponge rubber. It stands 12 inches high and is 14 inches long and comes individually boxed in a colorful comic box. Daisy is supplied with a dog tag and collar and is furnished with a red monogrammed woolen coat. Promoted by King Features Syndicate, Daisy retails at $5.95. It is sold and advertised by leading department stores and chains, including Best & Co., in New York City.

Rubber Raincoat Standards

A move to establish minimum standards of construction and performance for boys' rubber surfaced raincoats was announced recently by the Coated Materials Division of the Rubber Manufacturers Association. The proposed standards grew out of recent work by the Division's Protective Coating End Use Committee and carry the recommendations of the Executive Committee. The recommendations are as follows and represent the minimum in each instance: Tensile strength of coated fabric, 25 pounds in either direction; tear resistance, 2 pounds in either direction; adhesion, 5 pounds on a 2-inch strip; weight of coating, 10 ounces plus or minus 1 ounce per square yard; hydrostatic resistance, 25 pounds.

Progress on New Belt Plant

Construction of a new industrial rubber belt factory by the B. F. Goodrich Co. at Akron got under way recently. Announced last August, concrete has already been poured for the foundation and structural steel work will be started shortly. Designed in the shape of a huge "L", the structure will measure 350 by 260 feet on its longest side. It will cost more than $5,000,000 and will have 175,000 square feet of floor space. Although equivalent to a five-story building in height, the plant will have a main floor and mezzanine only. It is expected to be ready for operation late this year.

HATSCH ADDRESSES QUEBEC ON RUBBER INDUSTRY IN EUROPE

The April 28 meeting of the Quebec Rubber and Plastics Group, held at Legion Hall, Montreal, Quebec, Canada, was addressed by R. E. Hatsch, manager of the Sales and Technical Service Division of the Polymer Corp., Sarnia, Ontario, Canada. The subject of Mr. Hatsch's address was "The Rubber Industry in Europe."

Mr. Hatsch discussed in some detail the improvements in the past three years and referred particularly to the conditions of the rubber industry in the various countries. Generally speaking, the rubber industry of the Western European countries has made a remarkable recovery, he said. Interest in synthetic rubber is growing and the demand for special products increasing.

Despite serious importation difficulties, firms such as Michelin, in France, have been successful in converting completely to the use of butyl in the manufacture of inner tubes. In the first nine months of ECA, Western Europe produced 20% more than it had the year before.

Keener Refutes Pay Demands

J. W. Keener, vice-president of the B. F. Goodrich Co., said that there is no justification for a fourth-round of wage increases in the rubber industry at this time in an address before the American Management Association in New York recently. Mr. Keener, who is in charge of Goodrich's labor relations, pointed to the decline in the cost-of-living index to substantiate his argument that unions should put aside their demands for more money. He warned that wage increases at this time might precipitate a serious business decline and depression. Mr. Keener's statement came a few weeks in advance of scheduled contract talks between Goodrich and the United Rubber Workers of America (CIO). Present contracts expire on June 25.

Ethylac Primary Accelerator

Sharples Chemicals Inc., Philadelphia 9, Penna., has developed a new self-activating primary accelerator combining high activity with good delayed action and good processing properties. Named Ethylac, the new accelerator is practically dust free and is non-discoloring. Chemically, Ethylac is 2-benzothiazyl-N,N-diethylthiocarbamyl sulfide, combining the important chemical structures of both thiazole and thiuram types of accelerators. Ethylac is light yellow to tan in color, has a characteristic odor and a melting point of 71° C. min. It has a volatility of 0.5% max., a specific gravity of 1.27 and an approximate molecular weight of 282.4.

Elects New Vice-Presidents

Election of three new vice-presidents was recently announced by the Okonite Co., Passaic, N. J. The new vice-presidents are Stephen A. Wilson, general counsel and secretary of the company, W. R. Van Steenburgh, Northeast District sales manager, and I. W. Borda, Pacific Coast District sales manager.

FEBRUARY CASING SHIPMENTS DECLINE 7.95% FROM JANUARY

A total of 4,865,469 automotive casings were shipped in February according to the Rubber Manufacturers Association, which represents a decline of 7.95% from the January shipments of 5,285,403. Passenger casings shipped in February amounted to 3,936,490 units, and in January, 4,249,036 units. Truck and bus casings shipped in February amounted to 928,979 units, compared with 1,036,367 units shipped in January.

Automotive casings produced in February totaled 5,890,832 units. Of these, 4,782,570 were passenger casings and 1,108,262 were truck and bus casings. These figures compare with a total of 5,895,936 automotive casings produced in January, of which 4,772,116 were passenger casings and 1,123,820 were truck and bus casings.

Inventories of automotive casings at the end of February stood at 12,385,359 units, of which 10,180,057 were passenger casings and 2,205,302 were truck and bus casings. At the end of January, 11,339,446 automotive casings were on hand. Of these, 9,319,292 were of the passenger type and 2,020,154 were truck and bus casings.

Passenger and truck and bus tubes shipped during February totaled 4,404,006, compared with the 4,925,547 units shipped in January. A total of 4,921,766 tubes were produced during February, against the 5,062,357 units produced during January. At the end of February, 10,442,118 passenger and truck and bus tubes were on hand, which compares with the total of 9,814,837 tubes on hand at the end of January.

Gates Hears Talk On Isotopes

Approximately 90 members and guests attended the March 31 meeting of the Gates Technical Club at Cunningham's Restaurant, in Denver, Colo. The main speaker of the evening was W. A. Wicket, sales manager of Tracer Laboratories, Inc., who spoke on "Application of Radio Isotopes to Industry." Mr. Wicket pointed out many uses for tracer elements to measure reaction rates to determine amount of dispersion of one compound with another and with physiological applications. His discussion included an explanation of the alpha, beta and gamma particles and what effect they had on various applications. Following Mr. Wicket's talk, a movie entitled "Westward Course of Empire" was shown which illustrated the opportunities in the west for industrial enterprise.

Promotions at General Cable

D. R. G. Palmer, president of the General Cable Corporation, recently announced the election as vice-president of S. A. Smith, in charge of research and development; O. Garner, in charge of manufacturing, and A. D. Pettee, in charge of product engineering. Biographies of these three executives will be published in an early issue. Both A. L. Fergenson, vice-president and general counsel, and J. K. Schneider, vice-president and treasurer, have been elected to the General Cable board of directors.

Named Hycar Representative

T. C. Culver

T. C. Culver, associated with the B. F. Goodrich Chemical Co., Cleveland, Ohio, since 1940, has been appointed representative for the sale of Hycar and rubber chemicals produced by the company. During the war years, Mr. Culver served as chief chemist at the company's Louisville, Ky., GR-S plant operated for the Government. He joined the sales service laboratory of Goodrich Chemical in 1947 and until his new appointment had been engaged in sales development work. A graduate of Auburn with a B.S. in chemistry, Mr. Culver is a member of the American Chemical Society. His territory will include Western New York, Pennsylvania, Ohio, Eastern Michigan and a number of southern states.

Summaries of Tariff Information

The United States Tariff Commission, Washington 25, D. C., has recently completed several summaries of tariff information. Prepared in response to a resolution of the Ways and Means Committee of the House of Representatives, the summaries contain statistical data on various commodities including United States production, imports, exports, tariff rates, and other information pertinent to an understanding of the conditions of competition between imports and domestic production. Parts 7 and 9 of Volume 15 on Sundries contain information on rubber products, including tires, footwear, heels and soles, drug sundries, combs and miscellaneous manufactures of hard and soft rubber. Only a limited number of copies are available for distribution.

Reprints Still Available

Reprints of the article on "Advances in Rubber During 1947-48," the comprehensive article covering developments in the rubber field for the period cited which appeared in the January, 1949, issue of RUBBER AGE, are still available. Copies can be secured without cost on direct request to Mr. E. V. Osberg, General Tire & Rubber Co., Akron, Ohio.

FIRST QUARTER CONSUMPTION FALLS 8% BELOW 1948 TOTALS

According to the Rubber Manufacturers Association, consumption of natural and synthetic rubber for the first three months of 1949 amounted to 258,684 long tons, a drop of 7.69% from the 280,230 tons consumed in the first three months of 1948. A total of 148,625 tons of natural rubber were consumed during the first quarter of 1949, 9.17% lower than the 163,630 tons consumed during the corresponding period of 1948.

Total synthetic rubber consumed during the three-month period of 1949 amounted to 110,059 tons. This was 5.61% lower than the 116,600 tons of synthetic consumed during the first three months of 1948. Reclaimed rubber consumed during the 1949 three month period amounted to $56,487 tons, 22.22% lower than the 72,621 tons consumed in the 1948 period.

Consumption during the month of March amounted to 90,878 long tons, 12.40% above the February consumption of 80,853 tons. The use of natural rubber during March increased 13.27% to 52,280 tons from the 46,157 tons in the previous month. Consumption of synthetic rubber increased 11.25% to 38,598 long tons from the 34,696 tons consumed in February. Consumption of reclaimed rubber also increased in March to 19,820 tons from the 17,636 tons in February, a gain of 12.38%.

Form New ACS Division

Creation of a new division of the American Chemical Society to be known as the Division of Chemical Literature was announced recently. The new division will strive to promote more effective utilization of technical writings on chemistry. Norman C. Hill, of the C. P. Hall Co., Akron, Ohio, has been chosen acting chairman of the new division which held its first meeting at the ACS national meeting in San Francisco, Calif., March 28. The new unit, with a nationwide membership of chemists and chemical engineers, will undertake to solve one of the major scientific problems of the times, that of enabling the individual scientist and engineer to keep abreast of advances in every field of basic and applied research.

Goodyear Revives Marathon Line

Goodyear Tire & Rubber Co. has revived the Marathon truck tire, a prewar product. The tire is now available in 12 sizes, including 6.00-16 through 8.25-20, sizes which constitute about 70% of the entire truck tire market. The line is said to have all its prewar quality plus important improvements. Tread design is wide and flat, providing a large ground contact area. Body of the tire is made with full plies of rayon cord. Priced at bargain levels, Marathons are designed for users of smaller trucks who want economical low cost per mile service. About one year ago, the company announced the return of its Marathon passenger car tire, occupying a similar position in that line, to the truck tire.

Introduce New Good-rite Chemicals

The availability in experimental quantities of three new Good-rite chemicals not previously disclosed in the literature has been announced by the B. F. Goodrich Chemical Co. They are as follows:

(Benzothiazyl-2)-carboxyethyl Sulfide: This product has a low water solubility, molecular weight 239, melting point 139 141°C; can be recrystallized from alcohol. It is light buff-colored and dissolves readily in NaOH solutions. It is reprecipitated by the addition of acid.

B-Isothioureido Propionic Acid: This product can be recrystallized from water and is obtained as a hydrate or in anhydrous form, depending on the drying conditions used. It has a molecular weight of 148, melting point 178-180°C and is supplied as a white, crystalline anhydrous substance.

B-Dithiocarbamylpropionic Acid: This product has a low water solubility and can be recrystallized from an ether-petroleum ether solution. It is white, crystalline, has a molecular weight of 165 and melting point of 124-126°C. It dissolves readily in NaOH solutions and is reprecipitated by the addition of acid. A zinc salt can be formed by adding a water solution of a soluble zinc salt, as zinc chloride, to a water solution of the ammonium or an alkali metal salt of B-dithiocarbamylpropionic acid. The zinc salt is a white solid melting at 145°C. (decomp.). The zinc salt will react with amines, such as cyclohexylamine, to form addition complexes. If B-dithio carbamylpropionic acid is dissolved in alcohol and ammonia passed in, the insoluble ammonium salt precipitates. This is a white solid melting at 123-125°C.

These compounds may be expected to undergo the usual reactions of fatty acids such as esterification, salt formation, amide formation, etc. Data sheets and samples are available on letterhead requests to Chemical Sales Department, B. F. Goodrich Chemical Company, 324 Rose Building, Cleveland 15, Ohio.

Cabot Using Polyethylene Bags

Godfrey L. Cabot Inc., Boston 10, Mass., is now packaging its carbon black in a bag made of a miscible polymer film. The polymer film is entirely compatible with any rubber compound. Carbon black packaged in this manner may be added, still in the unopened film package, directly to the mill. The polymer film bag is enclosed in a standard paper container. Cabot advises the black which is packed in the film bag sells for ¼ cent over the standard paper wrapping.

Latex Distributors Moves Office

Latex Distributors, Inc., which formerly maintained general sales offices in New York City, has moved its sales office to the plant and laboratory at 1075 Hull St., Baltimore 30, Maryland. The phone number at Baltimore is South 0705. The company is the exclusive distributor in the United States of the Socfin organization's "Soctex" centrifuged latex and special purpose natural rubbers. Arthur Nolan is vice-president of the company.

Jaeger Joins Richardson Carbon

Robert Jaeger

The appointment of Robert Jaeger as a member of the sales department of the Sid Richardson Carbon Co. has been announced by Frank Andrews, sales manager. For the past three years Mr. Jaeger has been associated with the C. P. Hall Company, where he served as sales manager. For sixteen years previous to coming to Akron he was a member of the Technical and Lubricating Sales Department of the Standard Oil Company of Indiana. These past associations have obtained for Mr. Jaeger a wide acquaintanceship in both the rubber and the petroleum industries. He is also well known as the author of several papers on industrial processing and for some patent work on rubber reclaiming. Mr. Jaeger is a native of Boston, Massachusetts, having attended secondary schools there and in Cambridge, graduating from the Lowell Textile Institute in 1923. Having first joined the American Chemical Society in 1918, he is a member of the 25-Year Club of the Rubber Division, and numerous local rubber groups. For the present Mr. Jaeger will headquarter at the company's division office located at 335 South Main Street, Akron, Ohio, where F. A. Bonstedt is manager.

URWA Set for Pay Fight

According to George R. Bass, president of the Goodrich local of the United Rubber Workers of America, the rubber union will battle the companies "all the way down the line" to force demands for higher wages. Ward Keener, Goodrich vice-president, recently indicated in a public address that in his opinion wages hikes at present were unjustifiable. Negotiations between the Goodrich local and management on a new contract are scheduled to start on May 23. It is understood that the local will demand a wage increase, pensions of $100 a month, and sickness and accident insurance.

Distributing Formulary Cards

The Rubber Formulary, 1612 Nineteenth St., Bakersfield, Calif., has announced that it has distributed formulary cards covering the technical literature in the first half of 1948 to its subscribers. Cards covering data published in the second half of 1948 will be distributed within the next few weeks. All current 1949 subscriptions are being mailed on schedule, with cards covering formulas published in the first three months of this year already in the hands of subscribers. The Rubber Formulary is an entirely new approach in the way of service to the rubber manufacturing industry. It is an indexing service of rubber compounds, based on a specially-devised punch card system, covering tensile, elongation, hardness, etc. Full instructions are furnished the subscriber with his first batch of cards. Use of the cards enables the compounder to quickly determine the proper formulation for any desired property or group of properties. Full information on the system and costs can be secured direct from The Rubber Formulary.

Goodyear Receives Army Order

A $7,000,000 order for rubber tank tracks has been received from the Department of the Army by the Goodyear Tire & Rubber Co. The order will be filled by the company's St. Mary's, Ohio, and Muncie, Ind., plants. The St. Mary's plant will prepare the compounds and the Muncie plant will do the molding, curing and assembling. Akron officials said that 30,000 pounds of rubber will be used monthly under the contract which should be filled in a year. They said that the Government contract would stabilize employment in the two plants. After a 20% cutback in the past three months, the St. Mary's plant now employs 1,550. Muncie has 300 employees.

Battery Company Sues Pharis

Price Battery Co., Hamburg, Penna., recently entered suit against the Pharis Tire & Rubber Co., Newark, Ohio, for recovery of losses sustained when the Pharis company failed to purchase 50,000 batteries and 75,000 automobile batteries previously contracted for. Since Pharis went into liquidation last fall and has bought no batteries since November 17, 1948, the battery firm has on hand $3,416.30 worth of unsalable battery cases, it states. The battery cases, says the Price company, are imprinted with the Pharis name.

Firestone Low-Price Tire Line

A new, low-price tire line was recently announced by the Firestone Tire & Rubber Co. Known as the Convoy tire, the popular 6.00-16 size will sell regularly for $10.45, marking the first time a major rubber company has sold a national brand tire in this range since 1941. The Convoy tire was discontinued from the Firestone line at the outbreak of World War II.

PROGRAM FOR DISPOSAL OF THE GOVERNMENT-OWNED RUBBER FACILITIES

In accordance with the provisions of the Rubber Act of 1948 (Public Law No. 469, 80th Congress) the Reconstruction Finance Corporation on April 1 submitted to the President and the Congress a report with respect to the development of a program for the disposal to private industry of the government-owned rubber-producing facilities. The principles and recommendations contained in the report were formulated by a Government Inter-Agency Disposal Committee, under the chairmanship of an RFC representative, and included the views of the rubber, petroleum and chemical industries. Reference to the report was made in our last issue. Because of its importance we are reproducing the Disposal Plan in full.

DISPOSAL PLAN

General

The synthetic rubber industry, born as a wartime emergency necessity, is now an asset to a prosperous and expanding peacetime economy. The magnitude of the industry today, while due in part to the requirements of national security, is due also to the contribution made to the transition of the rubber fabricating industry from a military to a civilian economy. Of importance is the fact that its products, in many instances, are better suited to their various uses than natural rubber, for which they were originally developed merely as substitutes.

Before the passage of the Rubber Act of 1948, Congress for many reasons had not enacted legislation contemplating the merging of this new industry into the free, competitive enterprise system which is basic to the American concept of a self-sustaining economy. This Act requires that a plan be developed to integrate the industry with our economy on a sound footing "whenever consistent with national security." At the same time, and as its major consideration, the Act calls for the continuous maintenance—if necessary by Government ownership—of a synthetic rubber industry adequate for the needs of national defense.

The seeming conflict between the two purposes of the law is more apparent than real. It is true that purely commercial considerations at this time might not dictate the maintenance of a synthetic rubber industry of the productive capacity required by the Rubber Act of 1948. However, even those considerations which might spring from purely commercial values must take into account the necessity for adequate maintenance of any industry essential for the common defense. Thus it appears wholly possible to carry out the will of Congress that Government ownership and operation of synthetic rubber facilities be terminated at the earliest practicable date, and that a "sound industry" be established for the manufacture of synthetic rubber.

A sound industry must stand on its own feet in a competitive world. A fundamental attribute of such "soundness" is the ability of an industry to manufacture and sell its products in world markets at prices which will, in the long run, cover all costs and return a reasonable profit—without the benefit of special privileges or any advantages except those inherent in normal business activities, or peculiar to such an industry. Direct or indirect Government subsidies, or other advantages flowing from Government, and not available to industry in general, are in conflict with the basic principles of a free, competitive industry. It is equally fundamental to a concept of "soundness" that such an industry shall not be placed at a competitive disadvantage in a free economy as a result of the exercise of the powers of Government.

It has been stated as a principle established in the development of this disposal program that private enterprise must be able to make an investment in synthetic rubber facilities consonant with the cost of constructing new facilities for similar production. If private enterprise cannot contemplate such an investment, based upon the present state of development of the synthetic rubber industry, then it must be conceded that the industry has not attained a sound economic position in our economy and that private capital cannot justifiably assume the attendant risk of taking over its ownership and direction.

When any industry, large or small, has been developed to a point where a reasonable position in our economy can be maintained, irrespective of any known competitive force, it may be considered a sound industry. There is little doubt that some portion of the synthetic rubber industry as it exists today has attained this firm competitive position in the use field of rubber hydrocarbons. It is doubtful, however, if the industry as a whole has attained the position which would satisfy the minimum requirements of use set forth in the Rubber Act of 1948 as necessary for national security requirements. Industry representatives confirm this doubt, as indicated in the reports submitted by the rubber industry and petroleum-chemical industry advisory committees.

National security considerations may restrict the free use of synthetic rubber facilities after disposal. The degree to which security requirements or restrictions on the use of facilities may either increase or decrease the value of the facilities for use by private enterprise cannot be accurately determined in advance.

National security considerations have dominated the thinking in the development of the disposal program. Since it is impossible to forecast the requirements of national security over the reasonable life of a facility, it is impracticable to rely upon the commonly accepted economic approach, predicated upon the profit incentive, in determining the value of the facilities for the purpose of disposal.

Nor is it possible, under such circumstances, to appraise from the operation of normal economic forces the extent to which private enterprise might invest in a Government-owned facilities on a basis comparable to the cost of new facilities, if the Government facilities were available without any security restraints. The worth of the facilities, however, should not be "written off" because of unpredictable effects of security restrictions, nor because of the newness of the industry. The existence of this new industry assures rubber fabricators in the United States of adequate and available supplies of a basic raw material of uniform quality. Development of the synthetic rubber industry has contributed to the stabilization of rubber prices, and also has made possible, in many instances, better end-products than formerly were produced. These advantages to the rubber fabricating industry must be given due consideration in evaluating the rubber-producing facilities.

Any disposal program must embody safeguards against windfalls flowing to the purchasers of the facilities and, at the same time, provide a method of purchase that will not involve the assumption of extraordinary risks. These two objectives may be accomplished by:

(1) the sale of the facilities at their fair value, determined upon the basis of physical appraisal, which will assume the highest and best use, subject to adjustments necessary to reflect conditions peculiar to each respective facility;

(2) the purchase of a facility by making a reasonable down payment and assuming an obligation to pay the remainder of the fair value purchase price on a basis which will be directly related to the actual functional use obtained from such facility —with certain prescribed conditions with respect to minimum payments, continuity of operation, the right of reversion, the right of recapture, etc.

It is vital to the success of this disposal program that earlier purchasers of facilities for the production of synthetic rubber be assured that the terms and conditions of subsequent disposals for similar use will be in accordance with the pattern of the disposal program as originally established so that all purchasers may be assured of equal treatment. The factors considered in this section of the report present a basis for establishing such a pattern, within the framework of which disposal can be effected in the interests of Government and at the same time protect investments which are made from time to time in acquiring the rubber-producing facilities.

Research and Development

The commercial acceptance of the new "cold rubber" which is indicated will inevitably have an important bearing upon the long range outlook for the industry and accordingly must receive proper recognition in the disposal of rubber-producing facilities.

The Government-owned synthetic rubber industry has been developed to its present state through an intensive research and development program conducted in collaboration with a number of universities, industrial organizations, and nonprofit research institutions. The objective of these research activities was to discover, develop, and produce a synthetic rubber that would meet the requirements of the national security in times of emergency.

A complete exchange of technical information by means of reports and technical meetings has resulted in an unprecedented advance in synthetic rubber chemistry and technology, and is undoubtedly the important contributing factor to the rapid growth and development of the synthetic rubber industry in the United States. An

outstanding achievement of this teamwork of American chemists and engineers is the development and production of low-temperature rubber, sometimes referred to as "cold rubber."

"Cold rubber" derives its name from the fact that it is produced under refrigerated conditions at near-freezing temperatures in contrast to the existing process by which standard GR-S (general-purpose synthetic rubber) is produced at temperatures in the order of 120° F.

This new synthetic rubber polymerized at low temperatures has shown a substantial improvement over standard GR-S for use as a tire tread stock. New carbon blacks, especially adaptable to use in synthetic rubber, have been developed by the carbon black industry which further improve tread-wear performance. The combination of the new synthetic rubber and the new carbon blacks has resulted in tire treads which presently show a substantial improvement in wearing qualities over natural rubber.

The findings of industry substantially support the Government findings with respect to the improved quality of "cold rubber" over standard GR-S. A survey of industry indicated a demand for this new rubber which has resulted in the authorization of the installation of low-temperature facilities to produce approximately 200,000 long tons per year. These facilities will be in full production by the fall of 1949.

A large proportion of the tires currently being tested by the National Military Establishment for extreme cold weather usage were made from rubber produced by the cold-rubber process. Development work on "cold rubber" to date has been limited principally to evaluation for tire tread stock usage. This work is currently being extended into the tire carcass stock field as well as other fields of general use for which natural rubber is adaptable.

Many of the contributions to the technological advancement of the industry have been made through the operation of the Government-owned pilot plant and laboratory facilities located in Akron, Ohio. These facilities should be maintained for the foreseeable future under Government supervision to further effectuate the policy of the United States with respect to a technologically advanced rubber-producing industry.

Availability of Technology

As stated in the previous section, there has been a substantial development of technology, patented and otherwise, in the synthetic rubber field. Through its own activities and through arrangements with private industry and research organizations, the Government presently possesses substantial rights in the developed technology.

The Government should make such rights available on an equitable and nondiscriminatory basis for the operation of synthetic rubber-producing facilities, whether Government-constructed or otherwise, and for the further development and advancement of the synthetic rubber industry.

Disposal Authority

The President should be authorized by the Congress to exercise, through such departments, agencies, officers, Government corporations, or instrumentalities of the United States as he may designate, such powers, functions, duties, and authority as may be necessary for the implementation of the disposal program.

Negotiation and Transfer Period

Within 30 days after its designation by the President, the disposal agency should publicly announce its readiness to receive proposals and proceed with negotiations for the sale or lease of the synthetic rubber-producing facilities. Consideration of proposals for these facilities should proceed as rapidly as practicable, consistent with assuring full disclosure, subject to national security considerations, of pertinent information to interested parties. Proposals for purchase may be given consideration before proposals for leasing of the same or other facilities. At a definite date to be announced by the disposal agency, but not less than six months after the agency has announced its readiness to receive proposals, possession of all facilities for which negotiations have been completed shall be granted.

The entire period of time covered in the above procedure shall be termed "the first disposal period" under this program. The sale or lease of any property not disposed of within "the first disposal period" may be subsequently undertaken by the Government, but shall be within the pattern of the disposal plan if sold for the production of synthetic rubber.

Fair Value

As a principle of the disposal program it has been stated that all facilities should be sold at a "fair value." Fair value should assume highest and best use, adjusted to reflect conditions peculiar to each respective facility. It should be developed by a physical appraisal directed to the determination of the replacement cost. Such an appraisal should be made by a competent engineering organization thoroughly versed in the art of the industry. Conditions peculiar to a given facility would include such items as depreciation as reflected by the actual physical state of the property, obsolescence, economic effects of location, process factors, availability of feedstocks, and operating costs.

Since the conditions which influence a fair value determination are subject to human equation, the development of the fair value of a facility on the foregoing basis does not necessarily presage a fixed and inflexible finding. It does, however, afford a standard against which independent interpretations of the effect of these factors may be measured. It may be anticipated that negotiations will lead to reconciliation of differing views and that substantial agreement upon fair value will be attained within the established disposal pattern.

Terms of Sale

Four possible types of sales contracts are considered in the report. While a proposed functional-use contract is discussed at considerable length because of its complexity, this detailed statement should not be taken to indicate preference for this particular proposal.

From the standpoint of Government, payment in cash or a commitment to pay a sum certain over a future period of time would represent the most satisfactory form of settlement. Sales of this character should be encouraged by the negotiating agency.

The Government may not find purchasers ready and willing to make such a fixed investment in the rubber-producing facilities. In order to compensate for unusual risks which may be envisioned in the purchase of a facility at its fair value, determined as provided in this report, a purchaser should be enabled to acquire a facility upon terms which will give reasonable assurance against such risks. This can be accomplished through the medium of a reasonable down payment and the assumption of a conditional obligation to pay a given number of installments on a basis directly related to the purchase price and to the actual functional use obtained from such facility over a given period of time.

The following formula will establish the amounts of the installments to be paid annually upon the basis of functional use, assuming a down payment of 20 percent at date of settlement, with additional payments made annually over a 10-year period, and operation of the facilities at 85 percent of rated production capacity:

(1) Divide the purchase price less the 20 percent down payment into 10 equal amounts, the quotient to be the "theoretical annual installment" requisite to arriving at a "rate per unit" to be used in determining the actual purchase price.

(2) Divide the "theoretical annual payment" by 85 percent of the "rated production capacity" of the facility to establish a "rate per unit."

(3) Multiply the "rate per unit" by the number of units produced during the annual period, the product of this multiplication to be the actual annual payment made.

The sum total of these annual payments plus the down payment will aggregate the predetermined fair value purchase price, provided the facility is operated at an average rate of 85 percent of its rated production capacity during the 10-year period.

If, however, the facility is operated at an average rate less than 85 percent of its rated production capacity or at an average rate in excess of 85 percent of its rated production capacity during the 10-year period, the Government will receive less or more, as the case may be, than the original predetermined fair value purchase price. Eighty-five percent of rated production capacity is a satisfactory operating level, and by use of such a factor in determining the rate-per-unit payment the Government is assured of receiving the agreed-upon fair value purchase price, if the purchaser is able to operate at a satisfactory level during the payment period.

Annual payments shall not, however, be less than would be made if units of the facility were operated at 50 percent of rated production capacity. Failure to make such payments shall constitute default, and all default clauses hereafter stated shall apply.

In the event that a purchaser wishes to use a portion (or all) of a facility (originally purchased under the functional-use plan for the production of synthetic rubber) for purposes other than synthetic rub-

ber production, he shall negotiate an appropriate payment for facilities used for such other purposes.

All annual installment payments shall include interest which reflects the cost of borrowing by the Government on the effective date of the purchase contract.

Whenever the purchaser encounters economic difficulties in continuing the operation of a facility, the purchaser shall have the right to discontinue operations and, by written notification to the Government, to obtain the suspension of installment payments during such a period or periods, except that the suspensions shall not be for more than a total of 18 calendar months. In the event of any such suspensions the life of the contract shall be extended in direct relation to the duration of these suspensions.

During any suspension period or periods the purchaser shall maintain the facilities, at the purchaser's expense, in a condition satisfactory to the Government. Failure to maintain the facility in this condition or to resume operations and installment payments after the expiration of 18 calendar months shall constitute default by the purchaser, who shall forthwith surrender possession of the facility to the Government, and any such event shall further constitute a relinquishment by the purchaser of all payments theretofore made under the purchase contract.

In the event of default the purchaser shall surrender the facility to the Government in the condition in which it existed when possession was acquired under the purchase contract (normal wear and tear excepted) or, at the election of Government, the facilities may be repossessed in whole or in part as then constituted and the Government shall reimburse the purchaser for the fair value of any capital improvements retained and shall have the right to use such improvements and to convey such right to any subsequent purchaser.

Upon payment of all instalments required under the purchase contract, the interest of Government in the facilities shall vest in the purchaser and the Government shall thereupon execute and deliver, without representation or warranty, any instruments necessary to convey such interest.

Sales of facilities for a sum certain over a future period of time also may be made on a basis by which annual payments are related to production through use of a formula similar to that set forth in this section.

Terms of Lease

The leasing of facilities to private operators may be necessary as a temporary expedient. Such leases may facilitate termination of Government operation and production of synthetic rubber, but do not constitute disposal or terminate the responsibility of Government with respect to the obligations of ownership.

Under a lease agreement the Government continues in the position of landlord. As a lessor, it must supervise policies with respect to the maintenance of the facilities and be prepared to authorize and finance alterations for process improvements in order to assure technological advancement. The Government, to justify expenditures for such alterations, may require the disclosure by the lessee of valuable technical information which otherwise would remain confidential. The leasing of facilities for the purpose of producing synthetic rubber should be encouraged only when it cannot reasonably be expected that disposal can be effected by sale.

Leases should be at less advantageous terms to the lessee than terms of sale, and lease agreements should contain appropriate termination rights vested in the Government to permit the sale of the facility during the life of the agreement upon reasonable notice to the lessee. Such lease agreements should not contemplate the application of rental payments upon the purchase price of the facility in the event purchase is subsequently negotiated.

All leases of rubber-producing facilities necessary to the security requirements of the United States should contain appropriate security restrictions to assure the availability of the facility in the event of an emergency, together with adequate maintenance and default clauses, and any other provisions necessary to provide for the return of the facility in satisfactory operating condition.

Facilities may be leased on terms unrelated to those established for lease of facilities employed in the production of synthetic rubber, with the stipulation that such facilities shall not be used for the production of synthetic rubber.

Assured Usage

The termination of all regulations requiring mandatory use of synthetic rubber whenever consistent with national security is set forth in the Rubber Act of 1948 as the policy of the United States. The Act also requires, however, that an industry be maintained capable of supplying synthetic rubber for essential civilian and military needs in times of emergency.

The requirements of national security may make it necessary to authorize the imposition of controls regulating the use of synthetic rubber during and after the disposal period. The President should be empowered to implement the continued usage of synthetic rubber insofar as controls may be necessary. Information with respect to any such controls should be available to prospective purchasers of the rubber-producing facilities.

Government Manufacture of Synthetic Rubber

The Government should, after the transfer of facilities has begun, progressively cease the manufacture of synthetic rubber substantially in relation to the quantity produced by private industry.

To insure a continuous and adequate supply, the Government shall, however, provide synthetic rubber for mandatory requirements and to the extent practicable for voluntary requirements whenever the demand cannot be met by the facilities transferred, but the Government shall not have any obligation to resume the operation of facilities previously shut down to supply voluntary requirements.

As each plant is sold the amount of rubber or component materials produced by the Government should decrease in substantial relation to the amount produced by private industry. When the total requirements can be obtained from private industry, the Government should then cease entirely its production of synthetic rubber.

The Government's right to produce rubber in amounts necessary to permit compliance with any required use, if sufficient rubber is not available from private suppliers, or in periods of national emergency as subsequently enacted by the Congress, or determined and announced by the President, shall not be limited.

Retained Capacity

One of the basic principles which must be observed in a disposal program is the necessity for Government to protect the interests of small consumers of synthetic rubber who might otherwise be placed at a competitive disadvantage if a few of their major competitors are the sole purchasers of Government-owned facilities and become their only sources of supply.

When the synthetic rubber industry is completely integrated with our free competitive economy it is assumed that supplies of synthetic rubber will be developed for which markets will be sought on a highly competitive basis, thus affording to small consumers protection compatible with their position in a free competitive society. However, this condition will not necessarily obtain immediately after "the first disposal period" in which the present Government-owned facilities are sold to private enterprise. Conceivably such protection can be afforded by manufacturers who are not now users of the industry's product entering the industry as suppliers, or by combinations of small users purchasing facilities to provide their own supplies. The disposal agency should encourage sales of Government facilities with these objectives in view.

The sale of synthetic rubber on a price basis equitable to all users by the Government during Government ownership and manufacture of synthetic rubber has prevented any competitive disadvantage. A partial continuance of Government operation during the disposal program can similarly be used to offset inequities. Following the cessation of Government operation and as long as controls are in force making the use of synthetic rubber mandatory, it will be necessary to assure the availability of synthetic rubber at equitable prices to small users.

To provide such assurance, the rubber-producing facilities may, at the discretion of the Government, be sold or leased subject to the condition that a given percentage of the "rated production capacity" shall be retained over a stated period of time to produce for sale at the direction of the Government. Such plant capacity should be known as "retained capacity" and, while stated as a percentage of the "rated production capacity" of the facility, shall mean that the material thereby made available will be the number of tons that such percentage represents of the "rated production capacity" irrespective of the rate of operation of the facility.

Under the present Government regulations with respect to the enforced use of synthetic rubber, it is indicated that a "retained capacity" of approximately 15 percent of the "rated production capacity" of each end product rubber-producing facility

would enable the Government to make available sufficient rubber to protect the small users after the Government has ceased the manufacture of synthetic rubber.

It is contemplated that small consumers will make their own arrangements with private producers to obtain synthetic rubber for mandatory use, but if they are unable to do so, the Government should be authorized to intervene and upon reasonable notice to the producer direct the delivery to consumers of such materials from the "retained capacity" at a price which the Government considers to be fair and equitable on the basis of all relevant factors.

Maintenance of Standby Facilities

The Rubber Act of 1948 provides that synthetic rubber-producing facilities "having a rated production capacity of not less than 600,000 long tons per annum of general-purpose synthetic rubber and 65,000 long tons of special-purpose synthetic rubber" shall be maintained in operation or in adequate standby at all times. The law also provides that at least 45,000 long tons of the special-purpose rubber requirement shall be of a type suitable for use in pneumatic inner tubes.

The "rated production capacity" of the Government-owned facilities and designation of the facilities which shall constitute the plant capacity required for national security should be determined in advance of the initiation of negotiations under the disposal program. The basic facilities should include at least one alcohol butadiene plant.

Facilities which constitute the plant capacity required for national security and not sold to private industry should be maintained by the Government in such condition that in the event of a national emergency the facilities may be reactivated within a minimum time.

The cost of maintaining such a standby program may be paid by the Government from such sums as Congress from time to time may appropriate, but these costs should not be used as an element in determining the price at which any rubber produced by the Government will be sold.

Publishing New Rubber Journal

Publication of "Rubber India," the official journal of the Indian Rubber Industries Association, has been started at 7 Homji St., Fort, Bombay 1, India. K. M. Philip is editor of the new journal which will be published every other month. The first issue of the new journal, datelined January, 1949, contains articles on "The Moulding of Rubber and Mould Design," by F. Zinsenheim, "The Past and Future of Latex Trade," by P. P. Cherian, and "Utility of Reclaimed Rubber," by P. R. Narayanan. An article describing the formation and function of the Indian Rubber Industries Association is also included. According to an item in the issue, there are over 200 rubber manufacturers in India, with most of them devoted to the production of toy balloons.

Life Preserver Sports Jacket

Neptune Specialties, Inc., 190 Columbia Heights, Brooklyn, N. Y., has placed a sports jacket of lightweight fabric with a built-in Vinylite plastic life preserver upon the market. Designed for motorboat and sailboat enthusiasts, fishermen and

other marine use, the hidden life preserver can be quickly inflated in an emergency. The preserver is inflated by mouth by turning a valve cap on the left side of the collar and blowing into the action valve. The preserver extends from either side of the chest around the neck. A drawstring around the waist keeps the jacket fitting tightly when used in the water and the wearer's body, shoulders and head are kept from being submerged.

Reports U. S. Rubber Progress

The business outlook for 1949 is favorable, and on the basis of this outlook the U. S. Rubber Co. expects to continue a liberal dividend policy, Herbert E. Smith, chairman, told stockholders at the annual meeting held on April 19. Mr. Smith reported that sales in the first quarter were off 7% from the corresponding period of 1948, but that they had showed improvement in February and March after a sharp drop in January. Sales for the first 3 months of 1949 were approximately $121,500,000. At the meeting it was voted to increase the number of directors from 18 to 19. This action was taken to permit the re-election of Lucius D. Tompkins, who resigned on December 31, 1948, so that vice-president Arthur Surkamp could be elected a director on January 1, 1949. All directors were re-elected.

Resume Zinc Oxide Shipments

The American Zinc Sales Co., Columbus, Ohio, which recently settled a long-term strike with its plant workers, has announced that it is again in a position to make prompt carload and less carload shipments of both American Process lead free and 35% leaded zinc oxides. According to the company, the only issue involved in the strike was the company's insistence that the International Union of Mine, Mill and Smelter Workers comply with the Taft-Hartley Act by signing non-communist affidavits.

REPORT ON 1948 MEETING OF ISO COMMITTEE ON RUBBER

The International Organization for Standardization (ISO) Technical Committee 45 on Rubber held a meeting in London, England, on June 28 and 29, 1948. The official report of this meeting was recently received by the American Society for Testing Materials, through whose cooperation the following is presented:

Representatives from Australia, France, Italy, Netherlands, Poland, Switzerland, the United Kingdom and the United States were present at the London meeting. American representatives were Dr. L. A. Wood (Bureau of Standards) and H. G. Bimmerman (Du Pont). Mr. Bimmerman is very active in the work of A.S.T.M. Committee D-11 on Rubber and is chairman of Subcommittee XXII on Cellular Rubbers.

ISO Technical Committee 45 on Rubber Products was set up in February, 1938, and one meeting was held in London in May of that year. The meeting in 1948 was the first one which had been held since that time.

The program of the meeting covered hardness, tension, stress-strain, abrasion, and tear resistance testing. Although complete agreement was not reached on any of the testing methods under consideration, progress was made and it may be expected that the next meeting will be productive of refined testing procedures. The standardization of these basic rubber tests should result in better understanding of rubber literature by rubber technologists throughout the world.

The next meeting of the committee will probably be held in Holland about the middle of 1949. Several of the members of the committee expressed a desire to hold a future meeting in the United States, probably during the annual A.S.T.M. meeting so that the delegates would have an opportunity to attend both meetings.

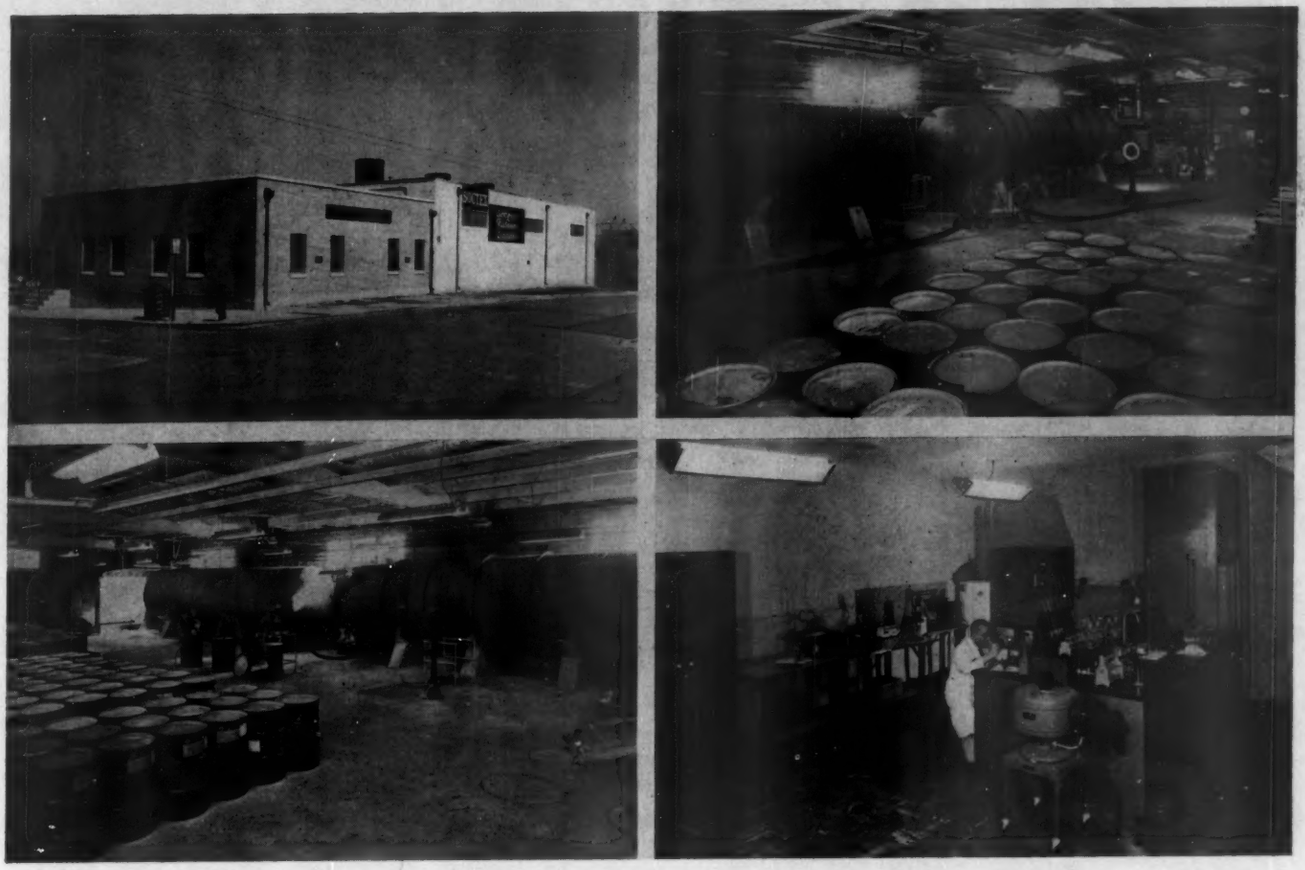
Okonite Names New Executives

Three new vice-presidents of the Okonite Co., Passaic, N. J., were appointed by the Board of Directors at their regular meeting on April 19. The new vice-presidents are: I. W. Borda, associated with the company since 1924, who will continue as manager of the Pacific Coast District; W. R. Van Steenburgh, who joined the company in 1917, and who will continue as manager of the North-East Sales District, and Stephen A. Wilson, associated with the company since 1936, who will also continue to serve in the capacity of secretary and general counsel.

Goodrich Closes July 4 to 11

The B. F. Goodrich Co. has announced that its Akron plants will be closed from July 4 to 11 to permit plant maintenance and emergency work. Additional summer plant closings will be announced in our next issue.

SOCTEX DEPOT IN BALTIMORE, MARYLAND, PUT INTO OPERATION BY LATEX DISTRIBUTORS, INC.



Latex Distributors, Inc., of New York and Baltimore, Md., distributors in the United States of Socfin's "Soctex" centrifuged latex and "special purpose" natural rubbers, recently opened their new plant and laboratory at 1075 Hull St. in Baltimore. Some views of the new plant are depicted in the above photographs. TOP LEFT: General view of the new depot. TOP RIGHT: Two of the steel handling tanks in the interior of the plant. BOTTOM LEFT: Another view of the general interior; open door in background is railroad tank car loading area; BOTTOM RIGHT: General view of the well-equipped laboratory. Sales offices of the company are now located at the Baltimore depot.

Polson's 40th Anniversary

Polson Rubber Co., Garrettsville, Ohio, will celebrate its fortieth anniversary this year. Harry B. Polson, chairman of the board, founded the company with his late brother, Charles A. Polson, in Kansas City, Mo., in 1909. In 1917 the plant was moved to Cleveland, and in 1923 to Garrettsville. For the past 26 years the company's primary activity has been in the manufacture of inner tubes. During the war, the company was the largest single supplier of replacement tubes for the armed services. W. J. Frisby, formerly associated with B. F. Goodrich, is president of the company, J. W. McConnell is secretary and F. H. Blum is treasurer.

Rubber Development Co. Formed

The Rubber Development Co. was recently formed at Kent, Ohio, for the manufacture of specialty molded mechanical goods, metal bonding, low durometer extrusions and lathe cut washers. Richard P. Ryan, formerly chief chemist of the Moldex Rubber & Plastics Corp., Philadelphia, Penna., is president and general manager of the new organization. The company employs approximately 10 persons.

Leaves American Hard Rubber Co.

Albert V. Bristol, associated with the American Hard Rubber Co. since 1915, recently retired as senior vice-president of the company. Three other company executives have also retired in recent weeks, including Robert Harry, secretary and assistant treasurer, who joined the company in 1900; Herman J. Schelhammer, assistant to the vice-president in charge of manufacturing, whose service dated to 1918, and O. B. Carson, manager of sales promotion who joined the company in 1919. Mr. Bristol continues as a director of the company.

Form Sperry Rubber & Plastic Co.

The Sperry Rubber and Plastic Co., Brookville, Ind., was recently organized. The firm expects to enter into production of extruded rubber and plastic products in a new factory occupying over 35,000 square feet by June 1. The company is headed by Pierce Sperry, formerly associated with the Johnson Rubber Co., Middlefield, Ohio. Products which the company manufactures will find use in refrigerators, radios, automobiles, washing machines and other appliances.

SinValastic Silk Screen Inks

Sinclair & Valentine Co., New York 27, N. Y., has announced the development of a new line of SinValastic Silk Screen Process Inks. These inks are designed for the silk screen processing of most kinds of porous and elastic rubber surfaces, and may also be used on certain types of prevulcanized rubber. The company states that these inks actually fuse and become part of the rubber on which they are screened. They will stretch without cracking or chipping. The silk screen process application lends itself to a diversified range of products and is practical for short runs and odd shaped objects.

Dedicate Firestone Library

The new $6,000,000 Harvey S. Firestone Memorial Library at Princeton University was dedicated at Princeton, N. J., on April 30. The six-story Gothic structure was begun in January, 1946, and was opened last September. It was officially placed at the disposal of scholars and students at the dedication ceremonies. All five sons of the late Harvey S. Firestone, Sr., all of them graduates of the University, were present at the dedication.

NAMES IN THE NEWS

NORMAN C. NAYLOR and WILLIAM H. FEHRE have been elected vice-presidents of the Union Asbestos and Rubber Co. MR. NAYLOR and EDWARD E. HOKIN have been elected directors of the company.

ALLEN H. OTTMAN, vice-president and controller of the American Hard Rubber Co. has been elected a director of the company.

LLEWELLYN S. HOWE, formerly associated with the Chemical Division of Orr & Sembower, Inc., Reading, Penn., as director of chemical and mechanical engineering activities, has joined the Chemical Division of the Glenn L. Martin Co., Painesville, Ohio, as director of engineering.

F. E. LACEY, associated with Swift & Co. since 1926, and head of the Industrial Oil Department since 1944, has been appointed manager of the company's Technical Products Plant at Hammond, Ind.

T. W. SMITH, JR., general manager of the Sun Rubber Co., has been named chairman of the Barberton, Ohio, Community Chest Campaign in 1949 for the raising of funds for 1950.

HENRY HOELL, foreman of the laboratory mill room of the Hood Rubber Co. at Watertown, Mass., who joined the company three years after it was founded, was recently presented a watch by the company to commemorate fifty years of service.

JOSEPH F. HUTCHINSON, sales engineer of the Goodyear Tire & Rubber Co., Akron, was one of ten young executives to be awarded an Alfred P. Sloan Fellowship at M.I.T. for the study of problems of industrial administration.

JAMES T. DALY, long associated with the insulated wire field, has been appointed assistant sales manager of the Plastic Wire and Cable Corp., Jewett City, Conn.

EARL W. BENNETT, chairman of the finance committee of the Dow Chemical Co., has been elected chairman of the board of the company, succeeding the late DR. WILLARD H. DOW. At the same time, LELAND I. DOAN, former director of sales, was elected president of the company.

ED G. DRISCOLL, formerly associated with the General Cable Co., at Rome, N. Y., has joined the Habirshaw Wire & Cable Co., Yonkers, N. Y.

DR. WILLIAM H. LYCAN, formerly executive director of research for the Paint Division of the Pittsburgh Plate Glass Co., has been appointed director of research for Johnson & Johnson, New Brunswick, N. J.

EDGAR T. ADAMS, JR., assistant vice-president of the People's National Bank and Trust Co., Pittsburgh, Penna., has been elected a member of the board of the Cooper Tire & Rubber Co., Findlay, Ohio. KENNETH L. FROST was elected a director and treasurer of the company.

JOHN O'NEIL, treasurer of the General Tire & Rubber Co., has been named a member of the board of directors, succeeding DAN A. KIMBALL who resigned his connections with the firm recently to accept appointment as Assistant Secretary of the Navy for Air.

ROBERT L. MOORE, formerly vice-president in charge of research and development for the Robbins Tire and Rubber Co., Tuscumbia, Ala., has been named director of research and product development for the United States Asbestos Division, Raybestos-Manhattan, Inc., at Manheim, Penna.

MATTHEW S. FOX, a partner in Charles Slaughter & Co., New York, has been elected vice-president of the Commodity Exchange, Inc., New York, to head the Rubber Group for a one year term.

RICHARD J. KETTERER, formerly with the Union Process Co., Akron, has joined the Edmont Manufacturing Co., Coshocton, Ohio, for development work in the field of coated fabric gloves.

PAUL J. WELSH, formerly associated with the B. F. Goodrich Co., recently joined E. F. Houghton & Co., Philadelphia, Penna., to do research on resins for textile applications.

THOMAS F. O'NEIL, a director of the General Tire & Rubber Co., has been elected board vice-chairman of the Mutual Broadcasting System.

W. A. TERWILLIGER, associated with the National Lead Co. since 1919, has been appointed manager of the Pigment Division of the Atlantic Branch of the company, succeeding WILLIAM F. HURLEY who retired recently.

FRANK PHILLIPS, chairman and founder of the Phillips Petroleum Co., has retired from active management of the company with the title of honorary director and chairman.

M. W. SLEDGE, associated with Goodyear Tire & Rubber Co. since 1935, has been appointed assistant manager of the Belting Sales Department of the company.

HARVEY S. FIRESTONE, JR., chairman of the Firestone Tire & Rubber Co., was recently elected president of United Service Organizations, Inc.

HARRY W. JULIAN, member of the board of directors of the Better Ball Co., Palmyra, Penna., has been appointed vice-president in charge of sales for the company.

L. S. VERDE, formerly technical sales representative for the Enjay Co., Inc., operating out of Akron, has joined the Armstrong Tire & Rubber Co. in Natchez, Miss.

HARRY M, FRECKER, formerly assistant development manager of the Mechanical Goods Division of the U. S. Rubber Co., at Passaic, N. J., has been named development manager.

NEWELL A. PERRY, JR., of the Thermoid Co., was recently elected chairman of the Trenton Section of the American Chemical Society, succeeding CARL W. VIRGIN of the Vulcanized Rubber & Plastics Co.

WILLIAM W. LONG, formerly associated with the Swan Rubber Co., is now with the Indianapolis, Ind., plant of the Richardson Co. as rubber chemist.

HAROLD A. MORTON, president of Rubber-Latex Products, Inc., Akron, has been nominated for an alumni trusteeship at Clark University in Worcester, Mass. He is a graduate of the Class of 1912.

EDWARD L. LOCKMAN, associated with the U. S. Rubber Co. since 1934, has been named manager of tank lining and roll covering sales in the mechanical goods division.

H. F. WAKEFIELD, development engineer, sales department, Bakelite Corp., Bound Brook, N. J., has been appointed a member of the newly-created advisory committee of the ACS News Service.

WILLARD W. WRIGHT, formerly New England regional manager for the Sun Oil Co., has been named general sales manager of the company with headquarters in Philadelphia, Penna.

Cable Plant Opening Set

Production is scheduled to begin in June at the new Kaiser aluminum rod, bar, wire and cable plant at Newark, Ohio, according to D. A. Rhoades, vice-president and general manager of the Permanente Metals Corp., which will operate the plant. The completed factory will have an annual capacity of over 100,000,000 pounds of electrical wire and conductor material and will employ about 600.

Expand Tubeless Tire Production

The Tuscaloosa, Ala., and Miami, Okla., plants of the B. F. Goodrich Co. have started volume production of the new puncture-sealing tubeless tire. Production had previously been limited to the main plant in Akron, Ohio. Plans are under way for the production of the tubeless tire at other company plants, with an installation at Oaks, Penna., probably next in line.

Konflex Resinous Hydrocarbon

Kenrich Corp., 120 Wall St., New York 5, N. Y., has introduced a new type of synthetic resinous hydrocarbon of unusual stability and extremely low electrical loss. It is produced by catalytic condensation of specific alkyl naphthalenes followed by purification and high vacuum distillation. Offered under the trade-name Kenflex, several grades are presently available. Kenflex A is derived from dimethyl naphthalenes. It has a drop melting point of about 160° F., a viscosity of approximately 300 centistokes at 210° F., an initial boiling point in excess of 400° F. at 2 mm., and a dielectric dissipation factor of about 0.0025 at 212° F. Allied materials of different viscosities and melting points can be made by selection of the proper alkyl cycloalkyl substituents. Kenflex B, for example, possesses characteristics respectively of about 80° F., 60 centistokes, over 400° F. at 2 mm., and 0.005. Kenflex is recommended for vinyl insulated wire, electrical cable filling, plotting and caulking compounds, rigid vinyl moldings, adhesive and sealing compounds, etc. The material is being made under arrangement with Socony-Vacuum Oil Co., Inc., who initiated the development and is seeking patent protection.

Thiokol Corp. Reports Progress

According to an announcement made at the recent annual meeting of the Thiokol Corporation, the project on solid fuels which the company has under contract with the U. S. Army is being transferred from Elkton, Md., to the Redstone Arsenal at Huntsville, Alabama, where a rocket arsenal is being established. This move was said to assure permanent operation and will strengthen the company's position in this field of research and development. It was also reported that Thiokol is carrying on a research program for the U. S. Army Engineers in oil resisting rubbers to perform at extremely low temperatures. This program has been increased over last year and will run until January, 1950. In the industrial field several new developments were mentioned at the meeting. A conducting putty for micro-wave equipment in television has been developed and is now being marketed. Base materials for special protective coatings were said to show excellent promise.

Represent Golden Bear Oil Co.

Golden Bear Oil Co., of Los Angeles, Calif., has announced the appointment of H. M. Royal, Inc., as sales agent for its petroleum products in the Trenton, N. J., area, and of the Wetherbee Chemical Co. in the Buffalo, N. Y., area. D. C. Maddy, of the Harwick Standard Chemical Co., is sales agent for the West Coast. Operations at the Oildale, Calif., refinery of the company are being expanded to produce the chemically identifiable components of high boiling petroleum fractions now available on the market as rubber compounding ingredients. This program is under the direction of Dr. Fritz Rostler, director of research and development.

"Jo Doe" Velon Raincoats

Dry comfort and smart styling are combined in the "Jo Doe" raincoats manufactured by the Dickey Manufacturing Co., Toledo, Ohio. Made of Velon, product of

the Firestone Tire & Rubber Co., the coat is sold with three vials of waterproof ink for autographing, initialing and writing of remarks or slogans that suit the owner's fancy. The coat, as illustrated herewith, is available in three colors.

Bizonal Rubber Production in 1948

According to the U. S. Department of Commerce, production of rubber goods in the British and U. S. zones of Germany in 1948 totaled 135,000 tons, which was 75% more than in 1947. The output of motor vehicle tires was 2,000,000 in 1948 compared with 1,000,000 in 1947, and of bicycle tires, 8,500,000 compared with 4,000,000 in the previous year. It is contemplated that production of motor vehicle tires will be increased to 250,000 units monthly, which will be sufficient to cover the demand for private cars and small buses, and that the output of bicycle tires will be stepped up to 1,100,000 or 1,200,000 monthly, sufficient to meet current needs. Approximately 85% of the German rubber manufacturing industries are in the Western Zones. Removal of the customs duty on rubber tires and better utilization of manufacturing facilities allowed a price reduction for tires of approximately 10% in the latter part of 1948 despite higher textile prices.

Polyethylene Bags for Black

Witco Chemical Co., New York 17, N. Y., has developed a new method for the packaging and shipment of carbon black in bags through the use of polyethylene bags which are tied with polyethylene cord. The polyethylene sheeting used in producing these bags is .003 gauge. According to the company, the bag offers an advantage in that in preparing the rubber mix, the bag and its contents can be thrown into the Banbury where, at a temperature of 200° F., the polyethylene disintegrates and completely disappears. The bags are waterproof and weigh approximately 3 ounces each. The packaging may be either in 25 pound or 50 pound bags, net weight.

Named General Superintendent

Michael L. Bayer, associated with the Mansfield Tire & Rubber Co., Mansfield, Ohio, for the past 19 years, most recently as superintendent of the curing division, has been named general plant superintendent. Mr. Bayer's new responsibilities cover operations of all manufacturing departments, the industrial engineering department and the personnel department. Mr. Bayer first became associated with Mansfield in January, 1930. In October of that year, he registered as a student of chemical engineering at the University of Cincinnati. He was enrolled in a cooperative course through which classroom work was combined with practical experience. He worked in the fabric testing laboratory at Mansfield and attended classes in Cincinnati on alternate months. His employment in the fabric laboratory was followed by assignments in the development department, tire construction and other operations. During the war he was superintendent of the fuel cell division, and when this was discontinued he became superintendent of third shift production. He was later made superintendent of the curing division.

Acquires Rubber Interests

Paul F. H. Reichert, president and general manager of the Reichert Float & Manufacturing Co., Toledo, Ohio, has acquired all of the stock interest in the Toledo Industrial Rubber Co., also of Toledo, owned by Alexander R. Nazar, former president of the company. At the same time, Mr. Reichert also purchased the interest of Mr. Nazar in the Illinois Industrial Rubber Co., located at Ladd, Ill., which was founded by Mr. Nazar in 1947 to serve the Chicago area. Continued operation of both plants on an expanded basis was indicated by Mr. Reichert. Joseph A. Wagner, until recently in charge of sales engineering for Miami Industries of Toledo, has been named general manager of both plants. Mr. Reichert is a native Toledoan and was graduated from Ohio State University in 1930 with a degree in mechanical engineering.

Yale Rubber in New Plant

Yale Rubber Manufacturing Co. has announced full scale operations at its new plant in Sandusky, Mich. The company's general offices have been transferred from Yale, Mich., to the new plant which was acquired about a year ago. With the construction of new warehouse and mixing buildings, the Yale company now has more than 60,000 square feet of floor space devoted to the manufacture of molded rubber products and extruded and sheet goods products. Considerable new equipment has been installed including presses, Banbury mixer and calendering machines. According to company officials, these new facilities more than double the firm's previous molded goods capacity. Organized four years ago, Yale also maintains a sales office and warehouse at 1433 Holden Avenue, Detroit, Mich.

FINANCIAL NEWS

Anaconda Wire & Cable Co.

For 1948: Net income of $7,009,136, which is equal to $8.30 a share, and which compares with $8,480,513, or $10.05 a share, the year before. Balance sheet items as of December 31, 1948, revealed current assets of $31,603,268 and current liabilities of $10,521,892, against $31,400,246 and $12,065,322, respectively, the year before.

Rome Cable Corporation

Nine months to December 31: Net profit of $865,421, or $2.12 a common share, against $797,700, or $1.94 a share, for the similar period of 1947. Net profit for the third quarter ending December 31, 1948, was $356,483, or 89 cents a share, against $243,437, or 59 cents a share, for the corresponding period of 1947.

Denman Tire & Rubber Co.

For 1948: Net profit of $12,547, which is equal to 32 cents a preferred share, contrasted with $282,062, or $1.32 a share, in 1947. Net sales in 1948 amounted to $2,131,019, against $3,734,522 the year before.

National Rubber Machinery Co.

For 1948: Net profit of $285,624, which is equal to $1.85 per share, and which compares with $472,148, or $3.06 a share, in 1947. Sales during 1948 amounted to $5,086,177, against $6,127,006 the year before.

I. B. Kleinert Rubber Co.

For 1948: Net income of $354,682, which is equal to $2.22 a share, compared with $424,258, or $2.65 a share, in 1947. Sales for 1948 amounted to $8,743,235, against $8,173,463 the year before.

Whitney Blake Co.

For 1948: Net income of $10,759, which is equal to 5 cents a share, compared with $443,922, or $2.22 a share, the year before. Net sales during 1948 amounted to $4,564,723, against $6,242,729 in 1947.

Belden Manufacturing Co.

First Quarter: Net profit of $157,301, which is equal to 49 cents a share, against $174,909, or 54 cents a share, for the corresponding period of 1948.

Asbestos Manufacturing Co.

For 1948: Net loss of $107,619, compared with a net income of $63,651, or 10 cents a share, in 1947.

Collyer Insulated Wire Co.

For 1948: Net income of $254,179, which is equal to $1.69 a share, against $270,682, or $1.80 a share, in the previous year.

U. S. Rubber Co.

First Quarter: Net income of $3,375,069, which is equal to $1.18 a share, compared with $4,601,164, or $1.87 a share, for the corresponding period of 1948. Consolidated net sales for the first quarter were $121,510,511, against $130,536,932 for the first quarter of the preceding year.

General Cable Corp.

First Quarter: Net income of $785,845, which is equal to 40 cents a share, compared with $1,072,799, or 46 cents a share, in the same quarter of 1948.

Detroit Gasket & Mfg. Co.

For 1948: Net profit of $1,363,923, which is equal to $2.60 a share, against $937,075, or $1.78 a share, the year before.

Price-Fixing Draws Penalty

Seven corporations and thirteen individuals accused of a price-fixing conspiracy in the shoe repair industry were recently fined a total of $44,250 in Federal Court, New York, after having changed their plea from innocent to no contest. Spokesmen for the Anti-Trust Division of the Justice Department said the prosecution had been started under the Anti-Trust Laws after veterans and others had found it impossible to gain entrance to the Metropolitan Leather and Findings Association. The defendant companies were members of the association. The following firms were fined $4,000 each: Catspaw Rubber Co., Baltimore, Md.; Goodyear Tire & Rubber Co., Akron, Ohio; I. T. S. Co., Elyria, Ohio; Linen Thread Co., New York; O'Sullivan Rubber Co., Winchester, Va.; and the U. S. Leather Co., New York.

Cooper Tire Cited by FTC

The Cooper Tire & Rubber Co. and its wholly-owned subsidiary, the Cooper Corp., both of Findlay, Ohio, have been ordered by the Federal Trade Commission to stop selling blemished or obsolete tires which are not clearly marked to distinguish them from first grade tires. Although the FTC recognizes that the company has sold these tires to dealers for resale at lower prices, the order was issued to protect the public from unscrupulous dealers who might market the tires as first grade.

Firestone Opens Plant Addition

A $2,000,000 plant addition to the Firestone Rubber & Latex Products Co., Fall River, Mass., was opened recently for the manufacture of foamed rubber cushioning material. Company officials estimate that the addition would bring the production of the material to six times what it was three years ago, when the plant capacity was doubled.

Goodyear Tire Test Road

Excellent results from its new, special tire test road have been announced by the Goodyear Tire & Rubber Co. Scientifically constructed, the road is located on the grounds of the company's Plant 3 in Akron. The road is flat or uncrowned, with a slight lengthwise slope, following the average gradient of the terrain. Its surface has a smooth, even texture. A portion of the road was specially treated to make a "slick spot," similar to those often encountered on the nation's highways. When this specially treated section of the test road is flooded with water, Goodyear development engineers are able to measure the skid-resisting action of the tires on a test car under the same conditions as though it were moving on a treacherously slippery highway during a rain storm. The road is also designed to facilitate the use of test instruments to compare the relative enveloping power or "ride" of tires. Other tests made with special instruments determine cornering power (measurement of the steering, angle, speed, attitude angle of the car and roll or tilt) and tire resistance to centrifugal force of the car.

Trainer Speaks on Safety

"Practically all accidents are prima-facie evidence of hazards in working environment, inefficiency in supervision or lack of adequate training," James E. Trainer, vice-president in charge of production for the Firestone Tire & Rubber Co., told the President's Conference on Industrial Safety recently in Washington, D. C., in a report which stressed the engineering approach to industrial safety. Firestone recently received from the National Safety Council its fourth consecutive "Award of Honor for Distinguished Service to Safety." The awarding of the honor to Firestone was based upon the records of the 21 Firestone plants in 11 states and in Canada, which have a total of 36,000 employees.

Dewey & Almy Borrows Money

In accordance with plans announced in its 1948 annual report, the Dewey and Almy Chemical Co., Cambridge, Mass., has borrowed $1,100,000 from the Massachusetts Mutual Life Insurance Co. The loan is dated April 1, 1949, and bears interest at the rate of 3¼%. It is payable in 10 equal installments beginning June 1, 1953. Half of the proceeds of the loan was used to repay a $550,000 short-term note previously held by the same insurance company.

ACS Council Increases Dues

In accordance with action taken by the Council of the American Chemical Society during the 115th meeting in San Francisco the week of March 28, ACS dues will be raised from $9.00 to $12.00 on January 1 next. Subscription rates for all journals published by the society will also be increased at the same time. The increases were authorized by the Council on the recommendation of the board of directors.

Goodyear Plantation Operations

Tangible evidence that Goodyear Tire & Rubber Company's plantations in the Far East are fast resuming normal operations was seen recently, with the arrival at Akron, Ohio, of 225 tons of crude rubber, received from the company's Dolok Merangir Estates in Sumatra. The shipment was the first received by Goodyear from that source since the start of World War II. Prior to the war, Dolok Merangir was one of Goodyear's largest rubber growing operations. It was seized by the Japanese early in 1942, and held by them until the close of hostilities. Rubber production on the plantation was resumed in 1947, under a Dutch appointed custodian, pending a decision by Goodyear as to recovery of the property. It was formally repossessed by the company on December 30, 1948. J. J. Blandin, vice-president of Goodyear Rubber Plantations Co., and manager of the Crude Rubber Division, hailed the shipment as the first step in Dolok Merangir's return to large volume production estimated to reach eight million pounds during the current year. Another of the company's prewar Sumatra holdings, the Wingfoot plantation, has recently been placed in limited operation under the supervision of an Indonesian Government-appointed custodian. A Goodyear plantation survey party is in Sumatra, ready to make a complete survey of this plantation and report on its present condition. The survey is expected to start shortly.

Reopens Naples Production Unit

The Dewey and Almy Chemical Co., Cambridge, Mass., is reopening its Naples, Italy, factory and is considering the possibility of establishing a plant in France, it was announced recently by Hugh S. Ferguson, executive vice-president of the company. Mr. Ferguson recently returned from a two-months' trip abroad. More efficient production and better political stability are helping Western Europe make substantial progress toward a "modest though not luxurious living standard," he asserted.

Data on Meeting

The Spring Meeting of the Division of Rubber Chemistry, A.C.S., will be held at the Hotel Statler in Boston, Mass., on May 23 to 25. Highlights of the meeting follow:

Technical Sessions: Ballroom, Hotel Statler, May 23, afternoon; May 24, morning; May 25, morning and afternoon.

25-Year Club Luncheon: Parlor A, Hotel Statler, Noon, Monday, May 23.

Clambake: Monday evening, May 23, at Marblehead, Mass. Transportation by buses from Hotel Statler.

Plant Trips: Tuesday afternoon, May 24. Transportation by buses from Hotel Statler.

Banquet: Imperial Ballroom, Hotel Statler, Monday evening, May 24. The Suppliers' Cooperative Cocktail Party will be held in the Georgian Room of the hotel prior to the banquet.

Vibrin 108 Polyester Resin

The Naugatuck Chemical Division of the U. S. Rubber Co. has developed a new polyester resin that is nearly white, which makes possible color casting and impregnating work heretofore possible only with thermoplastic materials. Known as Vibrin 108, the new resin is said to permit decorative work with clear color and high color retention. Its low water absorption favors its use in out-of-doors applications. When a peroxide catalyst is used, curing takes place at medium temperatures. Cures may be initiated at lower temperatures when promoters of low-temperature catalysts are used. The product is adaptable to continuous laminating or to casting wherever the best color retention is required.

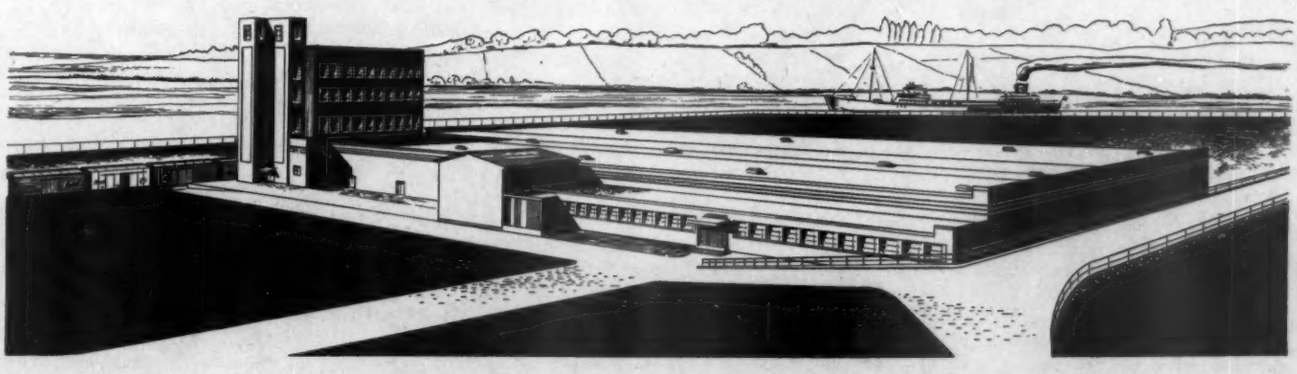
Acetylene Pilot Plant Operating

The new pilot plant of the General Aniline & Film Corporation at Grasselli, N. J., which is devoted to the manufacture of derivatives of acetylene under high pressures and elevated temperatures, was recently placed in operation. The technique permitting the use of acetylene under high pressures and temperatures was developed in Germany during the last war and has been extended and improved by General Aniline. Briefly, it consists of two methods, one involving the dilution of acetylene with an inert gas and the other, wherein acetylene is reacted in what is essentially small-bore equipment providing a minimum of free space for gases to collect. Presently the work being carried on involves two processes, vinylation and ethynylation. The vinylation products include methyl, ethyl, butyl and isobutyl vinyl ethers. One, polyvinyl methyl ether, has the unique property of being soluble in cold water and insoluble in warm water. Another of the vinylation products is Koresin, a reaction product of p-tertiary butylphenol and acetylene, which is a brittle resin-like material effective for tackifying synthetic rubber. Koresin is reported to be developing specialty uses in the fabrication of mechanical rubber goods.

Bar German Synthetic Rubber

The United States, Great Britain and France in an agreement signed recently at Frankfurt, Germany, restricted production and regularized prohibitions on German industry having a substantial war potential. The restrictions covered the production of synthetic rubber and butadiene. The synthetic rubber plants now standing probably will be destroyed, since, according to experts, it would be difficult if not impossible to dismantle the complex machinery involved and reassemble it elsewhere. The United States halted synthetic production in its own zone some time ago because it was cheaper to import supplies of natural rubber.

NEW FIRESTONE PLANT AT FALL RIVER, MASS., NEARING COMPLETION



Pictured above is an artist's drawing of the new one and three-quarter million dollar plant for the manufacture of foamed rubber products being constructed by the Firestone Tire & Rubber Co. at Fall River, Mass. Production at the new factory is scheduled to begin in May. Expansion of facilities to produce Foamex products will enable the company to meet steadily increasing demands.

OBITUARIES

Arthur L. Mullaly

Arthur L. Mullaly, president of the Advance Solvents and Chemical Corp., New York, died on April 20 as the result of a heart attack suffered on a train while returning from Washington, D. C., to New York. Taken off the train at the Bay View station, he died a few hours later at the Baltimore (Md.) City Hospital. He was 61 years of age. Born in Fall River, Mass., Mr. Mullaly attended public and high schools in that area. For many years he was associated with the National Aniline & Chemical Corporation as sales manager on dyestuffs and later with the H. A. Metz Co. in a similar capacity. He founded the Advance Solvents organization in 1930 and was active in its management until his death. A resident of Deal, N. J., he was active in civic affairs and was president of the Deal Property Owners Association. He was a member of the American Chemical Society, as well as both the Chemists' and Manhattan clubs. A widow and son, Arthur, survive.

John Aspinwall

John Aspinwall, a pioneer in the artificial leather industry and organizer of the Fabrikoid Co., Newburgh, N. Y., died at his home in Balmville, N. Y., on April 28. He was 90 years old. Mr. Aspinwall, who had been retired for the past few years, was born in Paris and was graduated from Stevens Institute, Hoboken, N. J., in 1881. He founded the New York Leather and Paint Co. in 1899. Three years later he organized the Fabrikoid Co. and served as its president until 1910 when it was sold to E. I. du Pont de Nemours & Co., Inc. In 1919 Mr. Aspinwall became connected with the Coldwater Lawn Mower Co. of Newburgh. He was its president from 1923 to 1944, when he retired. Mr. Aspinwall served at one time as vice-president of the Stevens Institute Board of Trustees and held membership in the New York Microscopical Society, the New York Yacht Club, the Lawyers, Camera, Collectors and other clubs.

M. Kenneth Easley

M. Kenneth Easley, sales engineer of the American Zinc Sales Co., Columbus, Ohio, died on April 22 after an illness of several months. He was 52 years old. Mr. Easley joined American Zinc as a rubber technologist in 1921. He was named sales engineer in 1940. Mr. Easly was recognized as an authority on zinc oxide and its use in rubber, and was the author of a number of papers on the subject. He was a member of the American Chemical Society and the American Society for Testing Materials. His wife and daughter survive.

W. Bevan Dunsford

W. Bevan Dunsford, president and treasurer of the Lowell Insulated Wire Co., Lowell, Mass., died at his home in Chelmsford, Mass., on April 3. He was 44 years old. Born in Lowell, Mr. Dunsford was educated at Phillips-Andover Academy which he attended as a member of the class of 1923. He graduated from Christ's College, Cambridge University, Cambridge, England, with the class of 1927. He became president of the Lowell company in 1935 upon the death of his father who headed the company at that time. Mr. Dunsford was a trustee of the Central Savings Bank of Lowell, a director and former president of the Lowell Community Chest Association, and a former director of the Lowell Humane Society. During the war he served as a member of the labor-management war manpower committee for the Lowell area. His wife, a daughter and a son survive.

Edward C. Weitzel

Edward C. Weitzel, manager of the Crude Rubber and Preparation Department of the Firestone Tire & Rubber Co., died of a heart attack on April 2 at his home in Cuyahoga Falls, Ohio. He was 51 years old. Mr. Weitzel joined Firestone in 1919, and had been awarded the company's 30-year pin on April 1, 1949. A veteran of World War I, Mr. Weitzel founded the Akron chapter of the Rainbow Division Veterans Association in 1935, and served as its first president. He became national secretary of the association in 1941, held that office for three years, and then served two years as national president. Mr. Weitzel was a 32nd degree Mason, and belonged to the Firestone Country Club. Funeral services were held in Cuyahoga Falls with interment in Cincinnati, Ohio, where the deceased was born. His wife and son survive.

Martin J. O'Donnell, Sr.

Martin J. O'Donnell, Sr., one-time president of the Falls Rubber and Tire Co., Cuyahoga Falls, Ohio, died on April 11 in Cleveland, Ohio, at the age of 91. Mr. O'Donnell retired from business 15 years ago. More than half a century ago he founded the firm which installed the first electric elevators in Cleveland. In 1906 his company was purchased by the Otis Elevator Co. and for 7 years Mr. O'Donnell remained as vice-president of the Otis Co. In 1913 he joined the Falls Rubber and Tire Co. as president. In 1924, he was made vice-president of the old Cleveland Life Insurance Co. Mr. O'Donnell was one of the original trustees of the Catholic Charities Corp., and a year ago was named a Knight of St. Gregory by Pope Pius XII. Three sons and two daughters survive.

George P. Jenks, Sr.

George P. Jenks, Sr., formerly associated with the Goodyear Tire & Rubber Co., and the General Tire & Rubber Co., died on March 30 at his home in Decatur, Ill. He was 57 years old. Born in Porter, Ohio, Mr. Jenks had been associated with Goodyear for 31 years, most of the time in the Export Division. He spent 3 years at the Goodyear plant in Argentina. From 1945 to 1948 he was employed by the General Tire & Rubber Co. as manager of its plant in Chile. Funeral services were held on April 4 at the Adams funeral home in Akron, Ohio, with interment in East Akron Cemetery. His wife and two sons survive.

P. B. Stevenson

P. B. Stevenson, assistant comptroller for the Goodyear Tire & Rubber Co. of Canada, Ltd., at New Toronto, Ontario, Canada, died in that city on April 1 at the age of 51. An employee of Goodyear for nearly 30 years, Mr. Stevenson was born in Norwich, Ontario. He attended school at Woodstock, Ontario, and the University of Toronto. Following a period of service with the Canadian Army during World War I, he joined the company in the factory accounting department at New Toronto where he remained throughout his business career. He leaves his wife and three children.

Howard A. Ellis

Howard A. Ellis, former production superintendent of the Tire Division of the B. F. Goodrch Co., Akron, Ohio, died at his home in Akron on April 19 at the age of 56. Mr. Ellis was born in North Lawrence, Ohio, and had lived in Akron since 1916. He began working for the Miller Rubber Division of Goodrich in 1917. Mr. Ellis retired from business in May, 1945. Services were held on April 20 at the Billow chapel in Akron, with interment in Massillon, Ohio.

V. Arthur Murphy

V. Arthur Murphy, former assistant treasurer of E. I. du Pont de Nemours & Co., Inc., and wartime deputy director of the Office of Rubber Reserve, died on April 16 at his home in Baltimore, Md. Mr. Murphy, in failing health for the past few years, was 57 years old. After retiring from his position with DuPont in 1942, he was called upon by the Government to serve with ORR. His wife survives.

Frank T. Baker

Frank T. Baker, owner of the Frank Baker Rubber Co., Fall River, Mass., died on February 18 at a local hospital. Mr. Baker attended the Sacred Heart School in Brockton, Mass., and public schools in Fall River where he had lived for 26 years. Funeral services were held at the Dan'l. and M. J. Coughlin, Inc., funeral home in Fall River. His wife, four sons and three daughters survive.

LOS ANGELES NEWS

A satisfactory turnout was experienced at the regular monthly meeting of the Los Angeles Rubber Group held on April 5 at the Hotel Mayfair in Los Angeles. Dr. Giovanni's "lecture" on the "Preservation of Human Dignity" proved to be one of the most humorous entertainments the group has had in a long time. Some special entertainment was also furnished by "Mac" McLaughlin. A motion picture of the Los Angeles Dons in action was shown and musical entertainment was provided.

The speaker at the Technical Group Session, which precedes the regular meeting, was Dr. C. W. Sweitzer, assistant director of research of the Columbian Carbon Co. of New York. Dr. Sweitzer discussed "New Furnace Carbons for Cold Rubber," an abstract of which follows:

Improvements in synthetic rubber, especially cold rubber, concurrent with the development of fine furnace blacks from natural gas as well as oil, has introduced new compounding problems that require rationalization. Dimensional evaluation of these new carbons is not sufficient to explain their behavior in cold rubber. The irregular modulus behavior of the fine oil blacks (HAF) in cold rubber, for example, cannot be explained on the basis of the structure properties of the carbons.

Investigations have shown that mixing temperature is a dominant factor in the development of hardness properties (Shore hardness, modulus) in cold rubber with these fine furnace carbons. The fine oil blacks (HAF) are very active in the development of carbon gel, indicated as the controlling factor in modulus increase, and so require relatively cool temperatures to prevent overdevelopment of carbon gel in order to avoid processing and scorch difficulties. The fine natural gas blacks (VFF) are less active in this development of carbon gel and so can be safely processed at the high speed mixing temperatures commonly used with standard GR-S. When so processed to assure adequate carbon-gel development the VFF carbons give modulus, abrasion and road wear results fully equal to the HAF carbons, with a retained advantage in elongation that assures maximum resistance to flex cracking and aging.

This activity of the HAF carbons is tentatively ascribed to a greater avidity for oxygen as shown in oxidation tests with the loose carbons and tread stocks. (End of abstract).

The Golf Spring Tournament of the Los Angeles Rubber Group was held last month and attracted the usual enthusiastic attendance. Numerous prizes were awarded, including the following: *Blind Bogey,* C. E. Wilson (Golden State Rubber Mills); *Longest Drive,* B. R. Snyder (Vanderbilt); *High Score on Blind Hole,* W. B. Higbee (Southwestern Rubber); *Most Acurate Approach Shot,* F. J. Keefe (Southwestern Rubber); *Lowest Number of Putts,* A. L. Pickard (Braun); *Low Net Score,* F. H. Kienzle (Braun); *Longest Putt,* Tway Andrews (Royal).

The 1949 Summer Outing of the Los Angeles Rubber Group will be held on July 23 and 24 at Catalina Island. Progress on arrangements for the outing is reported to be progressing satisfactorily.

Bernard C. Riddell

Bernard C. Riddell, associated with the research laboratory of the Goodyear Tire & Rubber Co., died on March 20 in St. Thomas Hospital, Cuyahoga Falls, Ohio. He was 34 years old. Mr. Riddell had seen service as a Major in the U. S. Army during the last war. He was a member of the Knights of Columbus. Services were held on March 21 at the McGowan-Reid funeral home in Cuyahoga Falls, with interment in Fort Collins, Ohio, on March 24. His wife and daughter survive.

Hugh MacDonald

Hugh MacDonald, formerly associated with the Alden Rubber Co., Philadelphia, Penna., before his retirement two years ago, died of a heart attack on April 11 at the Rahway Memorial Hospital, Rahway, N. J. He was 67 years old. Mr. MacDonald was a former soccer football referee in Essex and Hudson Counties, N. J., and a Canadian Army veteran of the first World War. His wife, four daughters and a son survive.

William Richter

William Richter, former member of the board of directors of E. I. du Pont de Nemours & Co., Inc., and associated with the firm for 18 years, died on March 20 at his home in Philadelphia, Penna. He was 62 years old. Mr. Richter was general manager of the corporation's Fabrics and Finishes Division when he retired in 1944 because of ill health. He resigned as a board member in 1948.

Martin C. Stokes

Martin C. Stokes, retired eastern sales manager for the Bicycle Tire Division of the U. S. Rubber Co., died on April 5 at his home in Bronxville, N. Y. He was 75 years old. Mr. Stokes had been associated with U. S. Rubber for 47 years, and had retired a decade ago. He was a charter member of the Bicycle Institute of America. His wife survives.

Predicts High Replacement Sales

With a record season of motoring in prospect, automobile tire replacement sales for the next six months are expected to be at a higher level than in 1948, according to Howard W. Hawkes, assistant general manager of the Tire Division of the U. S. Rubber Co. The industry, he said, will sell about 25,800,000 passenger car tires for replacement during the six-month period of April-September, inclusive, compared with the 25,400,000 units sold in the same period last year. Truck tire replacement sales are also expected to exceed those of last year with an estimated 4,400,000 for April-September of this year, as against 4,189,000 in 1948 for a like period. Production of the tire industry this year is expected to total about 81,750,000 units, including passenger, bus and truck, and farm types, Mr. Hawkes said. Of these, 63,750,000 are passenger tires, 13,000,000 bus and truck, and 5,000,000 farm tires of all types. These figures include tires for both domestic and export use.

Goodrich Type 7051 Vinyl Film

One type vinyl film for industrial uses manufactured at its recently completed plastics plant at Marietta, Ohio, is being offered in rolls through the Industrial and General Products Division of the B. F. Goodrich Co. Known as Type 7051, the translucent clear film is finding use in industrial aprons, protective cuffs, table coverings, and other applications. It is made for use at normal room temperatures, although it is satisfactory under either colder or warmer conditions if "hand" and flexing are not primary requirements. Made in 36 and 54-inch standard widths, rolls of .004 gauge are 200 or 250 yards, .006 gauge are 130 or 160 yards, and .008 gauge are 100 yards. The film is packaged on six-inch cores, with the finished rolls approximately 9½ to 10 inches outside diameter and packaged in rigid tubes.

Union Carbide Phenol Plant

Union Carbide & Carbon Corp., New York, is planning to enter a division of coal tar chemistry by producing phenol at a new plant to be located near Marietta, Ohio. Previously, Union Carbide has purchased all the phenol it needed. The new plant is expected to be in operation late in 1950. It will produce the phenol from chlorobenzene, using a special catalyst, under patents granted to the late Dr. L. V. Redman, formerly vice-president of the Bakelite Corp., a Union Carbide subsidiary. The new plant will be operated by Bakelite as part of a long-range expansion program.

Tuf-lite Renamed Plio-Tuf

The family of high-impact-resistance rubber resins manufactured by the Chemical Division of the Goodyear Tire & Rubber Co., initially known as Tuf-lite, has been redesignated as Plio-Tuf. The name change was accomplished in order to bring the resins into closer identification with other rubber and allied products produced by the company.

CANADIAN NEWS

A serious error occurred in the lead-off item of our Canadian News Section in the April, 1949, issue. Excerpts presumably taken from a financial report of the Dominion Rubber Co., Ltd., were actually those from a report of the Dunlop Tire & Rubber Goods Co., Ltd. We are repeating the item in full below, properly credited to the Dunlop Tire & Rubber Goods Co., Ltd., and convey our apologies to both companies for the initial error.

The Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ontario, reports that its 1948 net profit was off 37% from the previous year. Although the year witnessed the return of competitive selling conditions in the rubber industry, sales were up 7% and represented a record volume. Increase is attributable in no small measure to new production facilities installed during the postwar period, it was said.

Higher level of wages, materials and other costs without compensating higher selling prices served to reduce profit margins on the sales of most products, it is stated. Although production methods were further improved during the year, the resulting economies were insufficient to offset the continuing pressure of rising costs.

Capital expenditures for plant, buildings and equipment amounted to $654,000 and included purchase of the warehouse at 496 Queen St., E. Toronto, under lease since 1941. These facts, together with a large investment in accounts receivable, contributed to the depletion in the company's cash resources and created the need for obtaining bank loans for the first time since 1941.

Canadian Lastex, Ltd., in which the company holds a 50% interest, experienced another year of satisfactory operations despite a sharp curtailment of export sales. Itarco, Ltd., a wholly owned subsidiary, was incorporated during the year for the purpose of producing and selling in Canada certain products of India Tire and Rubber Co., Inchinnan, Scotland, under agreement with that company.

The traditional pattern of sales in the tire and automotive products division was somewhat reversed in 1948 and peak demand usually expected in the spring and summer months did not occur until fall. Unfounded rumors of Government restrictions and controls on the distribution of tires brought about a sudden and unseasonal demand, with the result that tire inventories fell and production had to be stepped up to restore the position. The industrial rubber products division enjoyed another year of unprecedented volume and only during the latter months could production satisfy demand.

Further increases in building costs and the effects of the restriction on the importation on goods from the United States, influenced management to postpone plans for a major plant expansion at Whitby, Ontario.

During the year the company's liability for income and excess profits taxes for the period 1942 to 1946 inclusive was agreed with the Department of National Revenue and the tax provision in excess of requirements totaling $106,000 was transferred to surplus. The adjustment in respect of excess profits taxes resulted in a reduction of $37,000 in the refundable portion of taxes.

The year 1948 was a difficult one for the rubber companies in Canada. Increased costs of materials and labor, highly competitive conditions, a glutted replacement tire market and declining export sales were among the factors of affecting the industry.

Annual reports of the Goodyear Tire & Rubber Co. of Canada, Dunlop Tire and Rubber Goods Co. and Seiberling Rubber Co. of Canada show that the operating profits of these three companies, exclusive of other income for 1948, aggregated $6,309,000 or 32% below the 1947 record of $9,226,000 and that net earnings dropped 39 per cent to $2,746,000 from $4,485,000 in 1947.

The income tax bill for the same concerns in 1948 was reduced by $2,118,000 to $1,712,000, and reserves for depreciation were raised by $655,000 to $1,877,000.

Net profit of the Goodyear Tire & Rubber Co. of Canada, Ltd., for 1948 was $2,412,119 compared with $3,931,248 for the previous year, it is stated in the annual report. Plant improvements, sales continuing at a high level and additional lines of production, it is predicted, should result in enlarged markets and a full share of available business on a profitable basis for the future.

During the year under review, there were capital expenditures of $2,495,656 on new factories, and installation of additional equipment in old factories. Inventories rose from $9,902,185 to $10,619,131 and current assets declined from $15,526,773 to $14,452,548. Current liabilities, given at $3,841,943, are lower by $1,188,671.

Less rubber was consumed in Canada in January than in December, 13,924,000 vs. 15,007,000 pounds. Production of synthetic rubber was up however, from 10,003,000 pounds in December to 10,667,000 in January. The output of reclaimed rubber dropped from 786,000 to 737,000 pounds. Month-end stocks of natural rubber rose to 14,363,000 pounds from 13,052,000; synthetic stocks from 9,713,000 to 11,437,000; reclaimed rubber from 4,097,000 to 4,389,000.

Goodyear Tire & Rubber Co. of Canada recently advised the Toronto Stock Exchange that an additional 1,735 four per cent cumulative redeemable sinking fund preferred shares have been purchased for redemption and cancellation, reducing the number of preferred outstanding to 156,729.

A. C. McGivern has been appointed director of government sales for all divisions of the Dominion Rubber Co. Ltd., of Montreal. He has been with the company since 1907, and has held a number of responsible positions. George D. Tilley has been named assistant sales manager, mechanical goods, of the company. He joined Dominion in 1926.

Associated with the Goodyear Tire & Rubber Co. of Canada, Ltd., for 30 years, P. Barrie Stevenson, 51, died recently at Toronto. He was assistant comptroller of the Goodyear company at New Toronto. Former chairman and for many years a member of the New Toronto Board of Education, he was born in Norwich and was educated at Woodstock and Toronto. His home was at 89 Sixth St., New Toronto, Ont.

Employee of Gutta Percha and Rubber, Ltd., for 28 years, Frederick W. Vick, 61, died recently at his home in Toronto. He had been ill for some months. Mr. Vick was born in Montreal and came to Toronto as a young man. He was active in the IOOF, a member of the Fairview Lodge, and a past deputy grand master of District 35, Toronto. He was also a member of Humberview Rebekhah Lodge. Surviving are his widow, one daughter, and a son.

C. B. Cooper, general sales manager of the Goodyear Tire and Rubber Co. of Canada, Ltd., announces the appointment of F. G. Wilmott as assistant general sales manager. Mr. Wilmott has had over 20 year's experience with the company and is well known in the rubber industry. He has been manager of several departments in the sales division, latterly as manager of tire sales.

Named Titanium Division Head

D. W. Robertson, formerly manager of the Titanium Division of the National Lead Co., New York, has been appointed general manager of the division, succeeding C. F. Garesche, who has been appointed chairman of the newly-created research control committee. Mr. Robertson joined the company in October, 1926, in a sales capacity for the Titanium Pigment Co. As general sales engineer he was made head of Titanium's paint development laboratory in 1933. He was elected a vice-president and director of Titanium Pigment Corp. in 1938 and manager of the Titanium Division in 1947.

Chart of Decorative Flock

Edward A. Sheehan & Sons, South St., Walpole, Mass., an affiliate of the General Fibre Co., is currently offering a color chart of Walpole precision-cut rayon flock. Available in 1/32-inch, 3/64-inch and 1/16-inch cuts, these flocks come in 16 different colors and provide a suede-velour or velvet-like finish. The company also furnishes a full line of cotton flock for dusting or decorative purposes. Copies of the color chart can be secured on direct request to the company.

THE STORY BEHIND THE WORD...

BOYCOTT...

The word boycott comes from the days when Ireland was struggling against a system of absentee landlordism. Captain James Boycott, an agent for an English landlord, was especially unpopular because of his harsh treatment of the peasants. They pleaded for his removal but the landlord refused. In retaliation, the Irish refused to have any dealings at all with Boycott. From that time, we have called this system of social sanctions—"boycotting."

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First Name in Scrap Rubber.

H. MUEHLSTEIN & CO. INC.

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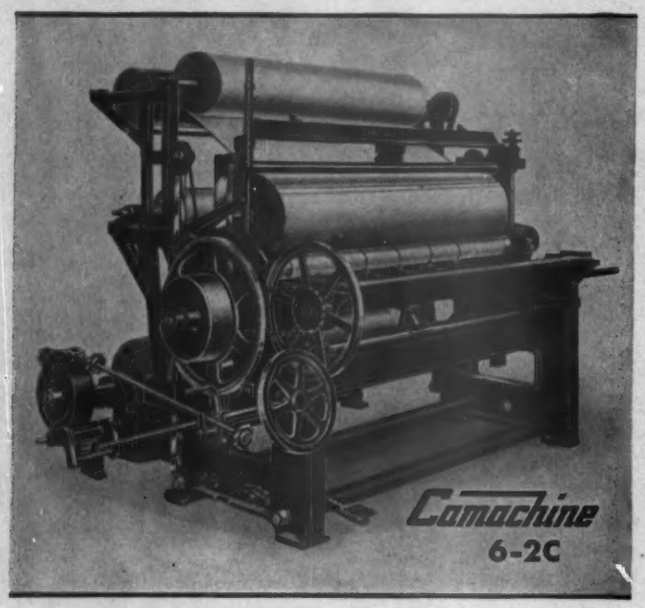
CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

Camachines

wherever rubber or plastics are processed in ROLL form



CAMACHINE engineers have perfected specialized slitters and roll-winders to meet requirements wherever rubber or plastics are made, shipped, processed or used in roll form.

A typical example is Camachine 6-2C, widely used by makers of tires, belting, hose, proofed goods and sheet plastics. Camachine 6-2C handles webs up to 62" wide, producing uniformly rewound rolls up to 24" diameter, and slitting strip as narrow as ½". Like all Camachines, 6-2C is simple in construction, easy and economical to operate.

Camachine specialists will gladly provide counsel regarding the right type of slitting and roll-winding equipment to meet your needs. Write for literature.

CAMERON MACHINE COMPANY
61 Poplar Street, Brooklyn 2, N. Y.

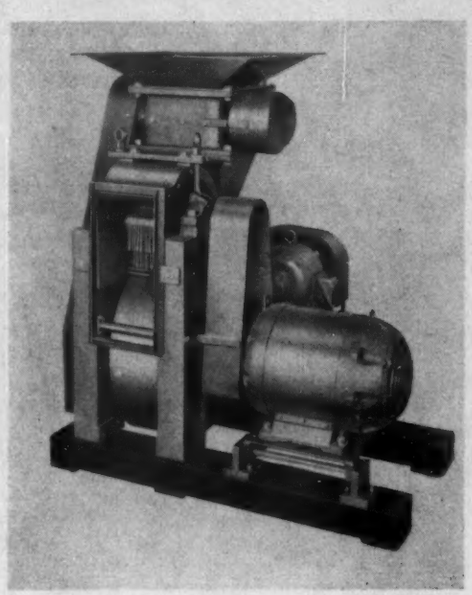
Camachines
FOR FAST, TOP QUALITY ROLL PRODUCTION
. . . the world over

AA-198

NEW EQUIPMENT

Mikro-Pulverizer No. 2 S-P Mill

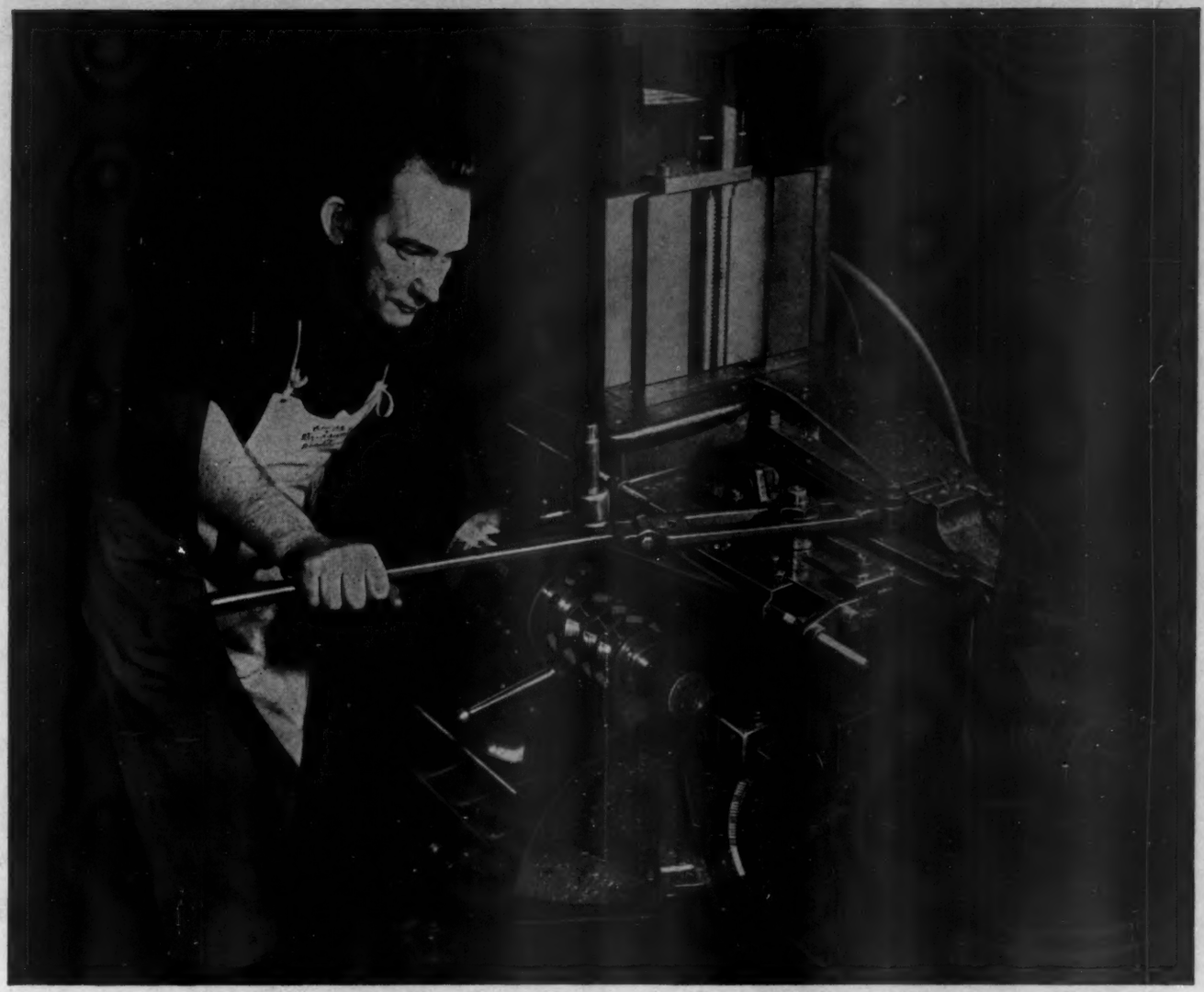
An improved type of mill for the grinding of plastic type materials was recently announced by the Pulverizing Machinery Co., 259 Chatham Road, Summit, N. J. Known as the No. 2 S-P Mill, this modification of the No. 2 Mikro-Pulverizer will grind plastic type materials having a high moisture or oil content. It will handle



clay bodies having a moisture content of from 18 to 22%. The mill will meet mesh specifications over a wide range of controlled particle sizes from coarse granulation in the 8 mesh size to fine granulation in the 20 mesh size. Mixtures or bodies containing silica, feldspar or similar abrasives can be handled without excessive wear or high maintenance.

In the new model, a roll or drum has replaced the feed belt to provide a machine with fewer parts and greater flexibility. The makers state that in certain industries the S-P mill has served indispensably to disintegrate materials as they come from filter presses, continuous filters, centrifuges, etc., and while they are still in a plastic or semi-plastic condition. Capacity of the new mill will vary according to the nature of the material and the fineness of the product desired. On some materials capacity will range up to as high as 15,000 lb. per hour using not more than 10 hp. Over-all dimensions of the mill are approximately 5 feet long, 4 feet wide and 4 feet high.

A new type of **photoelectric counter,** designed as a general purpose unit for installation on any conveyor system or automatic machine, has been developed by Photoswitch, Inc., Cambridge 42, Mass. The light source supplied with the unit has an adjustable lens system which permits narrowing down the light beam for counting very small objects.



CHANCE PLAYS NO PART IN BRIDGWATER *Accuracy*

THE inherent quality built in a tire is visible only in its outward appearance and is a function of the accuracy of the tire mold. That is why leading manufacturers specify "molds by Bridgwater."

Tire molds by Bridgwater are known for their precise, sharp corners and the accurate template fit of all characters and ribs in the tire design.

Much of this precision can be attributed to the special mold engraving machines developed and patented by us, and used exclusively in our Athens and Akron plants.

These unique machines make possible absolute mechanical and mathematical faithfulness in duplication of the original design — and at the lowest possible cost.

THE BRIDGWATER MACHINE COMPANY

Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES *SPECIFY* BRIDGWATER

PRECISION MOLDING MADE EASY

PHOTO COURTESY MURRAY RUBBER COMPANY

DC Mold Release Emulsion No. 35 permits easy release of Neoprene electric cable boots used in oil well surveying equipment.

Rapid flow of stock is imperative in molding the electric cable boots shown above. The cavity between the long mold core and shell is less than ¼-inch wide and there are 9 thin walled collars to be filled. Easy release of these complicated moldings is equally important. Each part must be perfect in every detail to pass inspection. But DC Mold Release Emulsion No. 35 makes this precision molding a relatively simple operation.

Production engineers at Murray Rubber Company of Houston, Texas, have learned by experience that DC Mold Release Emulsion No. 35 improves flow and gives easy release from even the most complicated molds. In this particular application, a dilute solution containing only 1 or 2 parts of Emulsion No. 35 to 100 parts of water is brushed on the mold cores to give easy release, to reduce scrap and to cut mold costs.

Like most of the leading tire and rubber companies, Murray Rubber has standardized on DC Mold Release Emulsion No. 35. This Dow Corning Silicone mold release agent readily wets metals to form a heat-stable silicone surface that improves the flow of hot rubber, imparts a high surface finish and practically eliminates non-knits and foldovers. DC Mold Release Emulsion No. 35 does not break down to form a carbonaceous deposit on the mold. Hence, molds stay clean 5 to 20 times as long and mold maintenance is greatly reduced.

DC Mold Release Emulsion No. 35 can be brushed, sprayed or wiped on molds to give easy release to a variety of rubber products including mechanical goods, tires, soles and heels, floor tile and toys. It's economical to use and easy to apply.

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Chicago: 228 N. LaSalle Street • Cleveland: Terminal Tower
Los Angeles: 1314 S. Hope St. • New York: Empire State Building
Dallas: 2722 Taylor St. • Atlanta: 34 North Ave. N.E.
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England: Albright and Wilson, Ltd., London

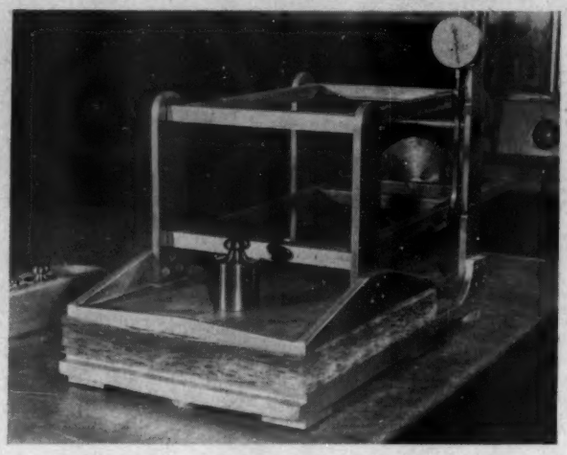
DC MOLD RELEASE EMULSION NO. 35

FOR MORE INFORMATION PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR CATALOG NO. 612V10

Dow Corning
FIRST IN SILICONES

Gustin-Bacon Measure-Matic

Even unskilled workers can consistently make accurate thickness measurements of such materials as latex foam sponge rubber, jute, cotton, glass fibers, etc., with the Measure-Matic produced by the Gustin-Bacon Manufacturing Co., 1412 West 12th Street, Kansas City, Mo. The unit measures the thickness of compressible or deformable materials within 1/100 of an inch. It also measures the compression and resilience of deformable materials, and records measurements on a dial that can be read quickly and accurately.



The backbone of the Measure-Matic is a table with uprights at the rear. Extending forward from the uprights are pivotal arms which carry a flat platen of one square foot area. These arms are so attached to the uprights and to the platen that when they are raised or lowered, the platen is also raised or lowered with its face at all times parallel to the table. Resting on one of the pivotal arms is a dial-indicator plunger. As the arms are raised or lowered the plunger actuates a dial which records within 1/100 of an inch the distance between the platen and the table. By adjusting a counter weight at the rear of the uprights, the platen can be made to balance perfectly above the table up to 5 inches.

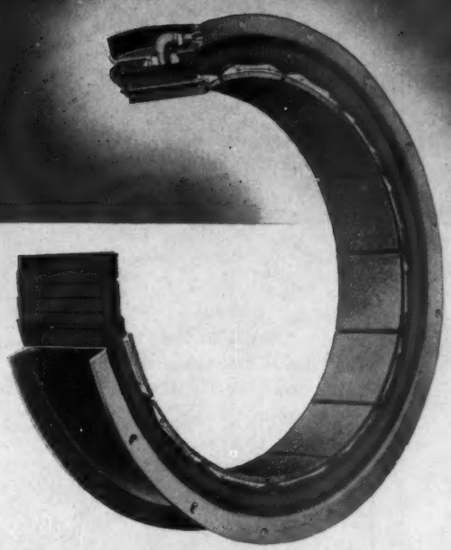
All parts of the unit are of aluminum, with the exception of the steel counter weight and threaded rod on which it is mounted.

Hancock Series 60 Valves

A major and exclusive improvement in the seat design of its line of Hancock Series 60 Globe and Angle Weldvalves of 2 inches and smaller has been announced by Manning, Maxwell & Moore, Inc., Watertown, Mass. These valves are now supplied with integral stellite seats. By providing seating surfaces of stellite, integral with the valve body, the need for seat replacement is completely eliminated. Leaks between body and seat, unavoidable with screwed-in, spun-in, or rolled-in seat construction, are not possible with the Hancock design. With the addition of the Series 60, all Hancock Steel Weldwaves, gate, globe and angle, 2 inches and smaller, will be furnished with integral stellite seats as standard production.

ONLY ONE MOVING PART

in this Fawick Clutch



Fawick Airflex Clutch or Brake Type CB

Fawick Airflex Clutch and Brake on Standard No. 7 Heavy-Duty 22" x 22" x 60" Warming Mill by Stewart Bolling & Co., Inc., Cleveland, Ohio.

Fawick Airflex Clutch and Brake on 60" Erie Engine Mill at Old Town Rubber Corp., Old Town, Maine.

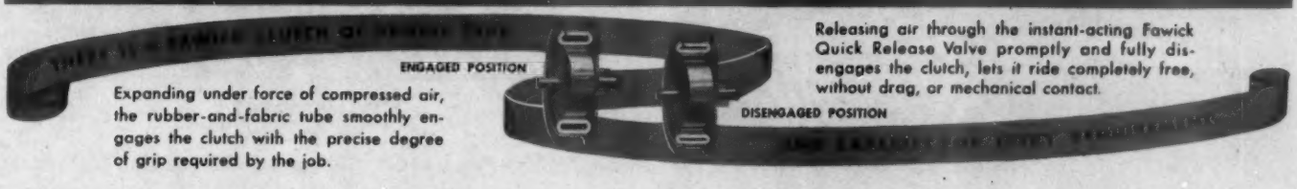
Fawick Airflex Clutch and Brake on 2 Farrel Birmingham Mill Lines 18" x 50" at Goodyear Rubber Sundries, Inc., New Haven, Conn.

The rubber-and-fabric pneumatic tube faced with friction shoe assemblies is the only moving part in this Fawick Clutch. This part naturally stays in perfect adjustment at all times—automatically compensating for wear of the friction shoes.

Job-tested, Fawick Clutches meet the toughest operating conditions in many fields—petroleum, earth-moving, metalworking, rubber, paper, pulp and others.

Write our engineering department for a recommendation of the Fawick elements best suited for your machines. Address Dept. RA.

FAWICK Airflex CO., INC.
9919 CLINTON ROAD CLEVELAND 11, OHIO



ENGAGED POSITION

Expanding under force of compressed air, the rubber-and-fabric tube smoothly engages the clutch with the precise degree of grip required by the job.

DISENGAGED POSITION

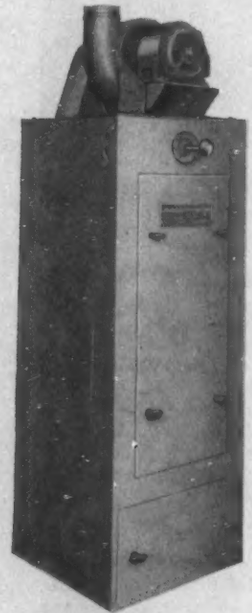
Releasing air through the instant-acting Fawick Quick Release Valve promptly and fully disengages the clutch, lets it ride completely free, without drag, or mechanical contact.

...for the Rubber Industry

WITH ONE CONTROL UNIT

or the new "Package Type" Unit

Greater employee efficiency, lower maintenance costs and increased production can be yours with a properly engineered central dust collecting system. Nationally-known plants such as that of the large rubber processing concern shown above, select Parsons consistantly for all their dust problems. Each of these Oval Bag dust arrestors handle 40,000 cubic feet of air per minute continuously, without shut-down.



Parsons' dust collecting systems are the accepted standard for collecting carbon black, talc and all types of rubber dust.

Introducing the new

Dust Control Unit

For collecting dust from individual machines, or from a small group of points where dust is localized in a more concentrated area, the Parsons "GEM" Dust Collector (left) is recommended. This small, compact unit, designed for quick installation, has ample filter cloth to maintain uniform suction. It has proved it's effectiveness in many kinds of rubber plant operations and in scores of other industries.

Write for **FREE** *Bulletin*

"Mastery Of The Air"

CREATIVE ENGINEERS

Parsons MANUFACTURERS ENGINEERING CORP.

2545 EAST 79th STREET, CLEVELAND, OHIO

Raywood Automatic Cut-Off Roll

A complete make roll incorporationg an automatic cut-off knife, electrically controlled, pneumatically operated and positive in action, has been introduced by the Noble Wood & Machine Co., Hoosick Falls, N. Y. Called the Raywood Automatic Cut-Off Roll, the development features a counter which can be set at any predetermined number of revolutions to produce identical sheets of uniform thickness within the liimts of vat control. Air pressure, released through special jets along the face of the roll, and timed with the stroke of the knife, aids in stripping the sheet from the roll after the cut is made. Production is continuous; the roll travels at a constant rate of speed and is not stopped or slowed down for the cut-off. The action of the knife is instantaneous. New plies for the next sheet start building up on the roll immediately without any interruption. These cut-off rolls are now being used to produce brake and clutch lining stock, asbestos-cement products, fibre (shoe) board, etc.

THE RAYWOOD AUTOMATIC CUT-OFF ROLL

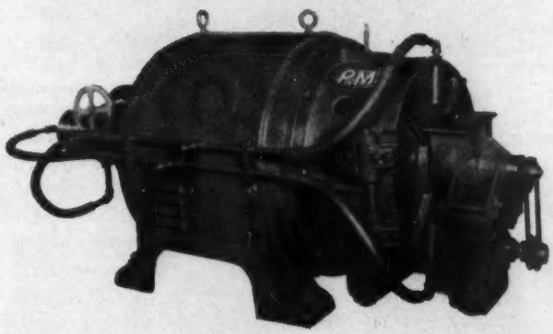
Cited as a revolutionary innovation in the manufacture of safety valves, the **Farriseal Bellows** has been introduced by the Farris Engineering Corp., Palisades Park, N. J. The unit completely isolates the lading fluid from the valve spring chamber and guide surfaces. According to the manufacturer, the guide cannot become fouled under any conditions.

P. M.
GRINDING AND CUTTING EQUIPMENT

•

HEAVY DUTY CUTTER

- This machine is specially designed for reducing to small size pieces all kinds of soft and hard rubber scrap.
- Water cooled sides allow continuous operation of the machine, without overheating.
- Provided with safety type drive pulley.
- The capacity of the P.M. CUTTING MACHINE is from 600 to 1000 lbs. per hour on soft rubber and 1000 to 1500 lbs. on hard rubber scrap.
- Power required 10 H.P. 4 V-belt drive.



HEAVY DUTY RUBBER GRINDER

- Available in Direct or Belt Drive.
- 50 H.P. motor.
- Operation entirely automatic.
- Water cooled to permit continuous operation without overheating.
- Fineness of ground rubber easily adjusted by simple turn of wheel.
- Capacity 400 to 800 lbs. per hour.

Developed to meet the need for a more rugged Scrap Rubber Grinder with increased capacity

RESEARCH ENGINEERING COMPANY
102-21 63rd Drive
Forest Hills, L. I., N. Y.

Set this Gage
...then forget your thickness troubles

That's all there is to it. Once it's set, the "Magnetic" Schuster Gage keeps a constant, continuous check and control of material-thickness right on the roll during processing. Any variation beyond set limits is detected by the Gage and results in any instant action you desire: a warning signal, or automatic corrective adjustment of the mill, or automatic stopping of equipment.

Every P&W setup — consisting of "Magnetic" Schuster Gage, "Magnetic" Control Meter, power unit — is planned to eliminate time-and-material-wasting thickness variables. Pratt & Whitney is prepared to recommend the best setup for your equipment and requirements. New descriptive literature is yours for the asking.

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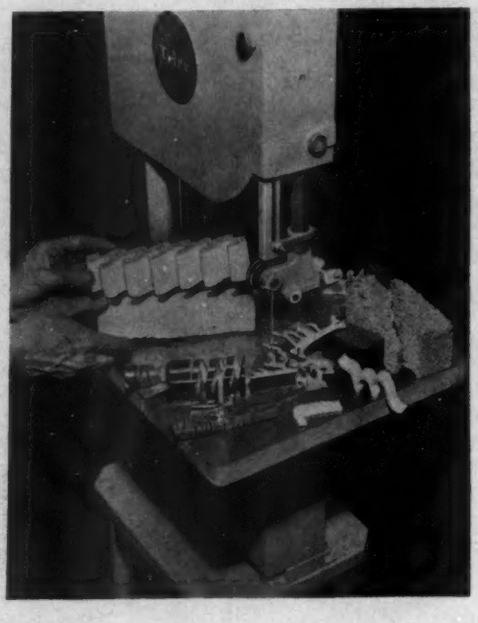

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"Rubber Report" is edited by Warren S. Lockwood and Howard C. Bugbee. Mailed to subscribers in the United States and twenty-one overseas countries the 15th of every month from W. S. Lockwood, Inc., 1631 K Street, N.W., Washington 6, D. C.

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REVIEWS

BOOKS

Elastomers and Plastomers. Vol. III. Testing and Analysis; Tabulation of Properties. Edited by R. Houwink. Printed in the Netherlands. Available in the Western Hemisphere from Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N. Y. 7 x 10 in. 174 pp. $4.50.

Part of the Elsevier Polymer Series on the chemistry, physics and technology of high polymeric and allied substances, the current volume is one of three specifically devoted to the chemistry, physics and technology of elastomers and plastomers. The first volume, which will be devoted to general theory, and the second, to manufacturing, properties and applications, have not yet appeared but are expected to be published sometime this year. All three volumes feature contributions by leaders in the respective fields, and all are edited by Dr. Houwink, who is external lecturer in the Technical University at Delft (Netherlands).

The volume under review contains five chapters, including an introductory chapter by Dr. Houwink. The other four chapters are: (1) Methods of Testing, by Dr. J. H. Teeple; (2) The Chemical Analysis of Polymers, by Dr. A. G. Epprecht; (3) Properties of Elastomers, by Dr. B. B. S. T. Boonstra; and (4) Properties of Plastomers, by J. W. F. van 't Wout and Dr. Houwink. A subject index is included.

The testing of physical, mechanical, electrical and chemical properties is treated by Dr. Teeple from a practical point of view and covers the principal methods used in the more important countries of the world. The properties of elastomers and plastomers are treated with in separate chapters since these two groups are characterized by completely different testing methods.

In many cases the American, the British and the German specification methods are applied in order to compare the results in various countries. In other cases, one or two of these methods are mentioned only, leaving the choice dependent on what might be considered the most characteristic method. For the elastomers, a large part of the tabulated values were measured by the Rubber Foundation at Delft, with the balance completed by compilation from the literature. Only chief and major sources in the technical literature are cited.

•

Handbook of Chemistry and Physics (31st Edition). Edited by Charles D. Hodgman. Published by the Chemical Rubber Co., 2310 Superior Ave., Cleveland 14, Ohio. 2756 pp. 4½ x 7 in. $6.00.

Like previous editions, the latest revision of this important reference handbook offers essential data invaluable to the daily work of every technologist. Compiled in five sections, it includes complete mathematical tables; properties and physical constants of the elements; properties of organic and inorganic compounds; chemical tables; tables of specific gravity; properties of matter; heat and hygrometry; sound; electricity and magnetism; light; conversion tables; photographic formulae; table of plate and film speeds; and a vast amount of other important data. Much new material appears in the 31st Edition. A table of logarithms of decimal fractions has been added; also a table of squares of the Sine and Cosine and their product. The former table of arrangement of electrons in orbits has been replaced by a table of electronic configuration of the elements. In step with the trend toward more intensive study of nuclear physics, a table of isotopic masses has been included; also a table of wave lengths of the principle lines in the emission spectra of the elements. This table is taken from data only recently available. Complete revisions and new material added to the handbook amount to 180 pages.

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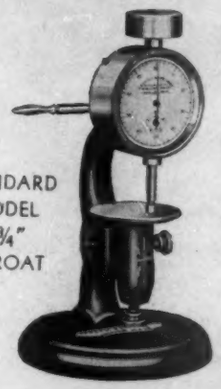

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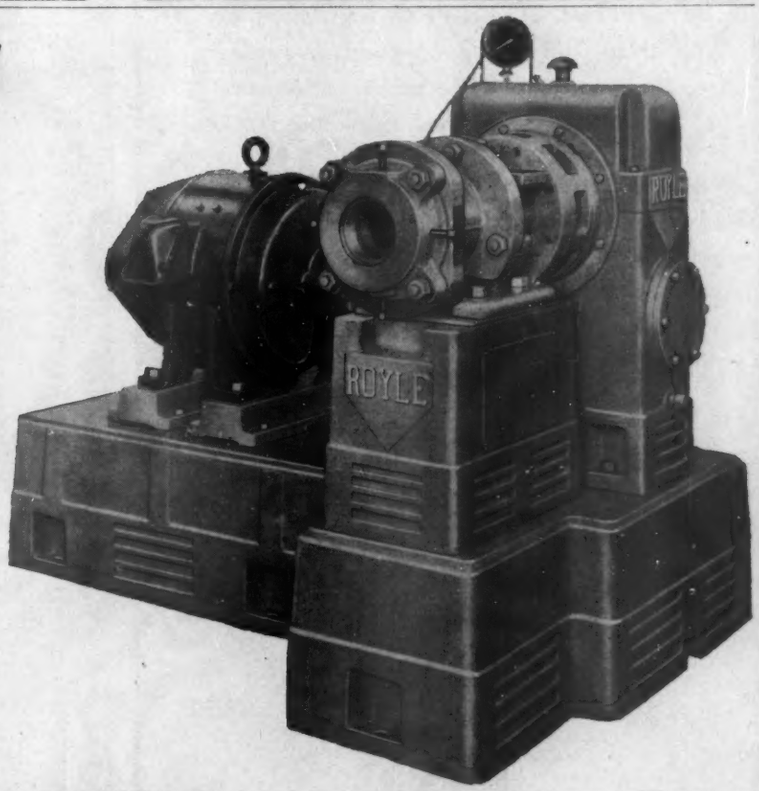

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Contributions to the Theories of Vulcanization (Chiefly Based on the T-50 Test). By Normann Bergem. Published by the A/S Askim Gummivarefabrik, Askim, Norway. 6 x 8 in. 210 pp.

Despite constant research initiated shortly after the discovery of vulcanization by Charles Goodyear, the true nature of this phenomenon is still problematical. As the author points out in his preface, it is not yet decided how the sulfur atoms are incorporated in the rubber polymer, what proportion are bridges formed between the chain molecules, whether such bridges are formed by monosulfide or polysulfide links, etc. This treatise is an account of the application of the T-50 method to some of these problems.

On the assumption that the T-50 value is not merely influenced by the degree of vulcanization but also by the mode of combination of sulfur with rubber, the author launched a series of systematic experiments to determine the influence of various compounding materials on the T50 value. The results of most of these experiments are included in this volume. The author points out, however, that exact interpretation of the experimental results depends on the complete understanding of the T-50 test, a satisfactory theory of which has not yet been published. A number of experiments regarding the physical nature of the test are therefore included. The data given by the T-50 test, which is a true physical method, are correlated to the results obtained by chemical methods, especially unsaturation measurements.

The book has five chapters in all, as follows: (1) Chemical and Physical Properties of Rubber; (2) The T-50 Test; (3) Dissolution and Fractionation of Vulcanized Rubber; (4) Decrease in Unsaturation during Vulcanization; (5) Discussion of the Experimental Observations and Their Bearing on the Mechanism of Vulcanization Reactions. There is also a comprehensive summary, and author and subject indexes.

•

Califlux Products. Chemicals Division, Golden Bear Oil Co., P. O. Box 846, Oildale, Calif. 6¼ x 9¼ in. 40 pp.

Issued as G. B. Report No. 3, this booklet contains detailed descriptions of the various specialty products made from heavy naphthenic crude oil by the company for the rubber industry which are sold under the trade-name of "Califlux." Chemically, the Califlux products are blends of the unsaturated components of naphthenic-base petroleum. Data is given on the manufacture of these products, the reproducibility of rubber compounds containing them, and the various grades and their specifications. One section of the booklet is devoted to a discussion of the identification of petroleum products used as compounding ingredients by chemical characteristics.

Philonoist?

SEE PAGE 124

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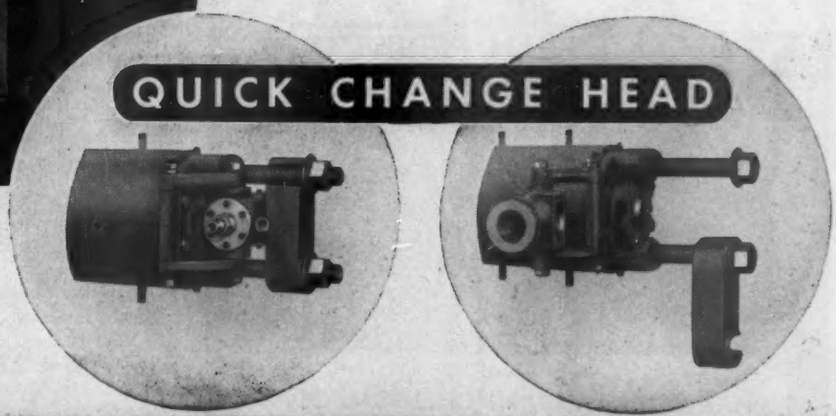

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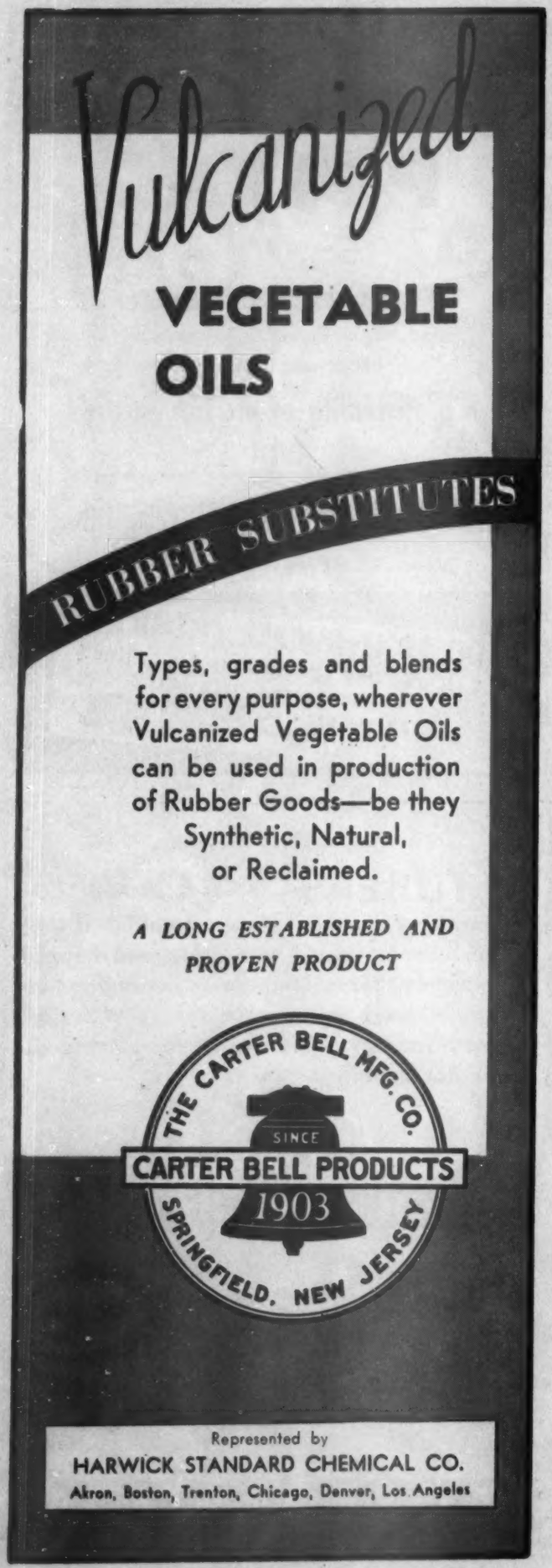
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Information and Technical Data on Seiberling Truck and Bus Tires. Seiberling Rubber Co., Akron 9, Ohio. 8½ x 11 in. 76 pp.

Descriptive information on Seiberling truck tires, plus size, load, and inflation tables on all tires, as well as information on changeovers and a plan for truck-bus tire application analysis for fleet operators, is included in this manual. Other sections cover load distribution between dual tires; rim information; technical data on disc wheels and valves; dimensional data on flaps; and much other information of this kind, grouped for easy reference. For the tire service man, there are many pages of service tips, information on proper loading, correct speed load ratios, tube mounting, rim data, and tables showing effects of overloading, speed, inflation, temperature, and other factors which affect tire performance. A section is devoted to descriptive and technical data on Seiberling commercial batteries, providing a ready source of information for the dealer or truck user. Another section of the book covers approximate weights of various substances, for the guidance of the truck operator when loading.

•

Taylor Force-Balance Liquid Level Transmitter. (Bulletin No. 98069). Taylor Instrument Companies, Rochester 1, N. Y. 8½ x 11 in. 4 pp.

This bulletin gives a clear and concise presentation of Taylor's Liquid Level Transmitter which is specifically designed to measure pressure and liquid level of viscous or corrosive liquids and liquids containing solids. It is particularly adaptable to open tanks as well as closed tanks under pressure or vacuum. The bulletin explains the Transmitter's force-balance principle of operation with a diagram to point out its corrosion resistant construction design. Application drawings show how it is adaptable to different types of installations and also for flow measurement service. Graphs clearly illustrate the Transmitter's highly responsive performance and technical data on accuracy, temperature limits and pressure ranges are defined so that ordering directly from the bulletin is made easy.

•

NBC: An Inhibitor of Dynamic Exposure Cracking for GR-S. (Report No. 49-1). By D. B. Forman and M. F. Torrence. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington 98, Delaware. 6 x 9½ in. 12 pp.

A description of the properties and applications of NBC (nickel dibutyl dithiocarbamate) as an effective inhibitor of both the static and dynamic exposure cracking of GR-S compounds is contained in this technical report. Physical test results on five typical formulations are given. The use of NBC in other elastomers, particularly neoprene, is also discussed in the report, especially in heat-resisting Neoprene Type GN stocks and non-black neoprene wire jacket compounds. The use of NBC as a retarder of sunlight deterioration for neoprene compounds is also discussed briefly.

•

Monsanto Plasticizers. Monsanto Chemical Co., 1700 South 2nd St., St. Louis 4, Mo. 9 x 11 in. 80 pp.

This is one of the most comprehensive manuals published to date on plasticizers. Not only does it contain full and complete details on the company's own line of plasticizers, which range from "standard" products to specialty products formulated to create improved properties in plastics and surface coatings, but it contains sections explaining precisely how a plasticizer works and methods of evaluation. Other sections in the manual are devoted to discussions of the performance and permanence of Monsanto plasticizers, the solubility of these plasticizers in various solvents, and recommendations for specific applications. Among the latter are molding compounds, plastic free films, adhesives, wood bonding agents, surface coatings and synthetic rubber.

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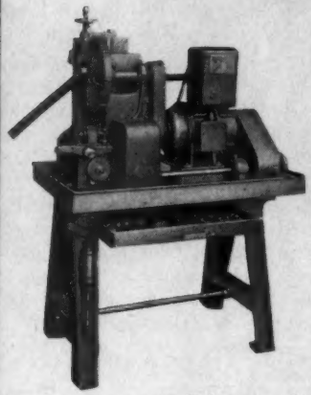

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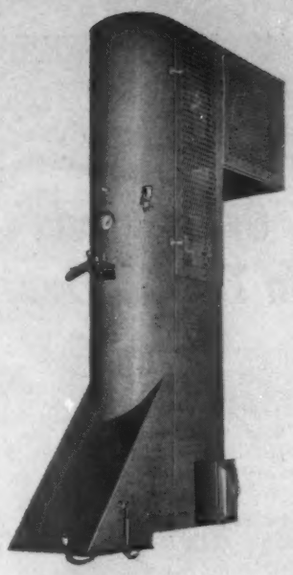

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DC Silicone News

DC 44 Silicone Grease Ends Bearing Failure in Textile Plant

Bearing failure may burn out your motors, stop your entire production line or ruin a mill run. That's why it's front page industrial news when the Plant Manager of a large textile plant reports that he has not had a single bearing failure since he started to use Dow Corning Silicone Oils and Greases over 30 months ago.

PHOTO COURTESY AMERICAN FINISHING COMPANY

DC 44 Silicone Grease in ball bearings on drying cans, operating at 400 r.p.m. around saturated steam journals, has 45 times the life of the organic grease previously used.

Typical of the lubrication problems that plague plant engineers in textile plants is the maintenance of "steam-heated" bearings. It used to be necessary to lubricate bearings on drying cans and the main cylinder bearings of Sanforizing machines once every 8 hour shift. Since American Finishing started to use DC 44, the re-lubrication schedule has been cut to once every 30 to 45 shifts. The lubrication of Slashers on textile mills presented a similar problem that has also been solved by using DC 44.

On tenter frame chains and races that travel through ovens at 400°F., petroleum oils carbonized so rapidly that the chains had to be cleaned periodically. That costly operation and the need for continuous lubrication have been eliminated by a weekly application of DC 710R Silicone Fluid.

American Finishing, like many other skillfully engineered companies, has found that Dow Corning Silicone lubricants more than pay for themselves in reduced maintenance costs. Increased production due to the virtual elimination of bearing failure is another one of the many bonuses Dow Corning Silicones pay to modern industry. For the most recent data on DC Silicone Greases phone our nearest branch office or write for data sheet No. D5V.

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REVIEWS (CONT'D)

Calcene T—A Low Cost Replacement for Some Thermal Blacks. (Data Sheet No. 49-1). By R. F. Wolf and F. W. Gage. Columbia Chemical Division, Pittsburgh Plate Glass Co., Pittsburgh 13, Penna. 8½ x 11 in. 16 pp.

The use of Calcene T as a low cost replacement for some thermal blacks is considered in this report not only from a technical standpoint, but from the view of savings effected through its use in the matter of shipment charges, geographical locations and freight rates. Typical formulations utilizing Calcene T in refrigerator strip compounds as a replacement for MT black, or as a replacement for FT black in a natural rubber hose tube compound, are discussed. Other formulations offered include Calcene T as a replacement for SRF black in a natural rubber channel compound, and as a replacement for FT black in a natural rubber gasket compound. Complete physical test data is presented in all cases in chart and tabular form.

•

Neoprene Type RT. (Report No. 49-2). By L. R. Mayo. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington 98, Delaware. 6 x 9½ in. 12 pp.

As indicated by its title, this technical report is devoted to Neoprene Type RT, the new polymer recently introduced by DuPont which possesses several advantages over the general purpose Neoprene Types GN and GN-A while retaining their desirable properties. In addition to a description of the properties of the new polymer, the report contains specific data on the crystallization of unvulcanized neoprene compounds at 60° F. and low temperature compression set of neoprene compounds. The data indicates that uncured Neoprene Type RT compounds have markedly improved retention of building tack and flexibility, while the vulcanizates have properties similar to those of Type GN or GN-A stocks but possess superior resistance to hardening due to elastomer crystallization.

•

Yale Load King Scale Weight Printer. (Bulletin P1135). Philadelphia Div., Yale & Towne Manufacturing Co., Philadelphia 15, Penna. 8½ x 11 in. 12 pp.

A new weight printer developed by the company is described in this bulletin which answers in some detail several questions on why it was developed, how it operates, what functions it will perform, how it is constructed, and what models are available to perform a particular job. Tables detail the available models and their full printing capacities. Illustrations show the important component parts of the printer as well as final assembly. Dimensions for space planning are presented in engineering drawings.

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MARKETS

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NEW YORK, MAY 6, 1949

Natural Rubber

The price for spot rubber on the Commodity Exchange has swung in a range of .63 cents since our last report (April 7), high for the period being 18.88 cents reached on April 8, and low being 18.25 cents on May 4. The average price of spot rubber for the month of April was 18.53 cents based on 20 trading days, which compares with an average of 19.08 for the month of March.

The Secretariat of the Rubber Study Group has estimated world production of natural rubber in February at 97,500 long tons, a drop from the 125,000 tons produced in January. Consumption of natural rubber was estimated at 112,500 tons in February, exceeding production by 15,000 tons. World stocks of natural rubber, excluding stocks in Russia and stocks held by the United States and British Governments, amounted to 742,500 tons at the end of February, compared with the 750,000 tons on hand at the end of the previous month.

Grade and quality of natural rubber continues to be a topic of discussion in local trade quarters. In view of the expressions voiced at the last meeting of the Rubber Study Group in London that Malaya will institute legislation in the near future to compel a marked improvement in the grading and packing and to gradually bring about a pre-war standard, the rubber trade here is anxiously awaiting developments in Malaya.

Today's quotations in the outside market, London and Singapore follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.18¾
May	.18⅜
June	.18⅜
Thin Latex Crepe:	
Spot	.25
May	.25
Thin Brown Crepe, No. 2	.15¼
Ambers, No. 3	.15¼
Flat Bark Crepe	.12⅜

London Market

(Standard Smoked Sheets)

June	18.01 - 18.22
July-September	17.92 - 18.03

Singapore Market

(Standard Smoked Sheets)

June	16.74 - 16.85

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.390 - .415
Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
GR-I	—— - .155
GR-S	—— - .185
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Paracril 18	.430 - .450
Paracril 26	.440 - .460
Paracril 35	.510 - .530
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

While a slight upward trend has been noted within the scrap rubber market, increases were not considerable, and volume is still limited. Tentative buying was reported for the bizonal occupation area in Germany, but export conditions remain at a relatively low level. Selling prices have not changed to any appreciable degree. Current quotations follow:

Mixed passenger tires	ton	$13.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton	13.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06¼
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03¼
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06
Black truck tubes	lb.	.03
Buffings	ton	15.00

Reclaimed Rubber

The demand for reclaim increased slightly in the past few weeks, but because of various factors, including the Ford strike, consumption for May is not expected to exceed that of April. According to the Rubber Manufacturers Association, consumption of reclaim in the first quarter of the year amounted to 56,487 long tons, a decline of 22.22% from the 72,621 tons consumed in the first quarter of 1948. Current quotations follow:

Tires

Black, Acid (Natural)	lb.	.09 - .09½
Black, Digester (Natural)	lb.	.08½ - .09
Peels No. 1	lb.	.09 - .09½
Whole Tire (Blend)	lb.	.08½ - .09

Inner Tubes

Black (Natural)	lb.	.12¾ - .13¼
Red (Natural)	lb.	.13½ - .14½
Butyl	lb.	.08½ - .09

Shoe

Unwashed (Natural)	lb.	.08¾ - .08¾

Cotton Tire Fabrics

On a comparative level, the market for cotton tire fabrics has maintained the low status evidenced for the past few months. The export situation remains a specific problem within the general situation, and this has been due, in great part, to the difficulties revolving about foreign monetary exchanges. Purchase of chafers by the rubber industry continues at a low level. A general price cut has gone into effect. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.72
Standard, Peeler, 14/4/2	lb.	.74
Standard, Peeler, 16/4/3	lb.	.7650
Extra Staple, Peeler, 12/4/2	lb.	.8315
Extra Staple, Peeler, 14/4/2	lb.	.8575
Extra Staple, Peeler, 16/4/3	lb.	.8825

Chafers

14.4 oz. (per sq. yard)	lb.	.71
9.25 oz. (per sq. yard)	lb.	.6725
11.65 oz. (per sq. yard)	lb.	.64
8.9 oz. (per sq. yard)	lb.	.6875

Cotton

The price of middling uplands on the Cotton Exchange has wsung in the rather narrow range of 81 points since our last report (April 7), high for the period being 34.31 cents reached on April 25, and low being 33.50 reached on April 28. The average price of middling uplands for the month of April was 33.84 cents based on 24 trading days, which compares with an average of 33.44 cents for the month of March.

The Department of Agriculture, in a final report, has estimated the 1948 cotton crop at 14,868,000 bales of 500 pounds gross weight. This compares with 11,857,000 bales produced in 1947, and with a 10-year average of 12,014,000 bales. First acreage reports of the new season estimate that farmers are planting some 25,821,000 acres of cotton.

The Senate Agriculture Committee has approved a bill which would allow the Secretary of Agriculture to use a formula contained in the Hope-Aiken Act instead of a 1938 law in determining the need for cotton acreage quotas in 1950. Senator George D. Aiken (Rep., Vt.), sponsor of the bill, said that passage of the measure would make 1950 acreage controls a little less likely.

Trade circles note that exports are expected to increase during the next few weeks. ECA authorizations are now being announced for European countries. Inasmuch as ECA shipments are gifts rather than loans, the price fixing date remains unimportant. However, foreign countries must keep their prices low in order to compete in world markets with their exportable goods.

Quotations for middling uplands on the Exchange follow:

	April 8	May 6		
	Close	High	Low	Close
May	32.32	33.84	33.68	33.78
October	28.92	29.25	29.12	29.21
December	28.62	29.04	28.92	29.01

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM APRIL 8 TO MAY 6

Date April	Spot	July	Sept.	Dec.	Mar.	Sales
8	18.88	18.40	18.25	17.90	17.65	88
9	....	....	....	....	....	...
10	....	....	....	....	....	...
11	18.62	18.35	18.10	17.75	17.50	10
12	18.38	18.15	17.92	17.57	17.32	45
13	18.38	18.16	17.95	17.64	17.39	74
14	18.38	18.15	17.90	17.58	17.33	39
15	....	....	....	....	....	...
16	....	....	....	....	....	...
17	....	....	....	....	....	...
18	18.38	18.15	17.90	17.60	17.35	9
19	18.50	18.20	17.96	17.65	17.40	6
20	18.38	18.20	18.00	17.65	17.40	27
21	18.38	18.16	17.95	17.65	17.40	50
22	18.38	18.20	17.95	17.65	17.40	13
23	....	....	....	....	....	...
24	....	....	....	....	....	...
25	18.38	18.22	18.01	17.76	17.50	86
26	18.50	18.40	18.20	17.90	17.65	64
27	18.62	18.40	18.20	17.90	17.65	180
28	18.38	18.06	17.95	17.70	17.45	12
29	18.50	18.18	17.95	17.70	17.45	70
30	....	....	....	....	....	...
May						
1	....	....	....	....	....	...
2	18.50	18.25	18.10	17.80	17.55	39
3	18.38	18.05	17.95	17.70	17.45	84
4	18.25	18.06	17.95	17.75	17.50	127
5	18.38	18.25	18.10	17.95	17.70	73
6	18.38	18.18	18.08	17.90	17.65	15

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS											
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,885,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1946	366,415	222,552,939	27.12	8,421	5,843,085	30.98	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1947	690,954	306,919,456	19.83	17,722	9,820,080	24.91	2,880	1,492,825	20.30	711,556	4,122	2,354,494	707,434
1948	702,293	290,849,177	18.49	32,762	18,288,223	24.92	302	71,330	10.53	735,357	6,672	3,259,324	728,685
1947:													
Aug.	43,637	16,127,766	16.93	1,784	960,877	24.48	104	24,768	18.54	45,525	191	118,666	45,334
Sept.	45,724	14,589,611	14.24	516	324,206	27.12	44	10,414	15.29	46,284	174	95,640	46,110
Oct.	46,898	14,819,306	13.11	3,081	1,370,242	19.85	....	.....	....	49,979	134	.64,620	49,665
Nov.	48,952	16,962,935	15.46	1,994	1,042,644	23.13	....	.....	....	50,946	514	289,752	50,432
Dec.	69,158	24,458,323	15.21	2,438	1,280,834	23.45	....	.....	....	71,596	371	215,958	71,225
1948:													
Jan.	76,723	29,782,199	17.33	4,130	2,044,850	22.11	....	.....	....	117,906	334	206,103	117,572
Feb.	51,528	21,027,604	18.06	2,400	1,420,676	26.43	43	10,235	10.53	53,971	290	170,339	53,681
Mar.	68,848	27,902,550	18.09	3,148	1,730,014	24.02	25	6,845	10.05	72,021	467	215,156	71,554
Apr.	38,433	15,136,536	17.35	2,284	1,260,932	24.65	30	7,076	10.53	40,747	343	190,815	40,404
May	37,227	14,409,747	17.28	3,442	1,915,744	24.84	40	9,435	10.53	40,709	1,031	485,941	39,678
June	62,376	25,338,739	18.13	2,288	1,335,173	26.05	60	14,152	10.53	64,724	718	348,043	64,006
July	60,070	25,206,980	18.07	3,654	2,002,902	24.48	100	23,587	10.53	63,734	466	243,774	63,268
Aug.	65,736	26,975,557	18.33	2,395	1,389,495	25.81	....	.....	....	67,771	520	268,912	67,251
Sept.	49,119	21,480,244	19.52	1,434	813,347	25.24	....	.....	....	50,553	514	229,016	50,039
Oct.	58,300	26,161,356	20.03	2,728	1,574,419	25.83	....	.....	....	61,028	675	320,570	60,353
Nov.	49,800	22,292,055	19.98	813	466,095	25.59	....	.....	....	50,613	772	349,315	49,841
Dec.	83,419	35,495,327	19.00	4,216	2,366,959	24.75	....	.....	....	87,635	569	250,540	87,066
1949:													
Jan.	66,575	27,037,698	18.13	1,132	634,165	25.02	....	.....	....	67,707	757	320,036	66,950
Feb.	55,234	21,549,791	17.41	2,159	1,030,107	21.30	....	.....	....	57,393	434	211,323	56,959

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber (Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1947:				
May	32,738	43,018	0	330,960
June	57,055	42,329	311	345,175
July	57,243	40,389	421	131,624
Aug.	44,672	47,289	191	130,040
Sept.	46,241	50,557	174	122,097
Oct.	49,340	57,286	314	114,115
Nov.	50,840	52,076	514	110,752
Dec.	71,414	56,284	371	129,038
1948:				
Jan.	80,564	58,174	334	136,227
Feb.	54,418	51,012	290	148,081
Mar.	72,070	54,444	467	130,295
Apr.	40,947	50,616	343	123,248
May	40,709	52,022	1,031	112,724
June	64,725	55,701	718	119,818
July	63,775	48,769	466	128,446
Aug.	68,131	53,366	520	129,622
Sept.	50,556	52,131	514	123,912
Oct.	61,027	49,617	675	118,187
Nov.	50,671	51,632	746	113,251
Dec.	87,634	45,985	569	141,541
1949:				
Jan.	67,706	50,188	757	125,050
Feb.	57,401	46,285	434	118,803

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1947:						
Aug.	151	159,338	143	78,357	19	46,667
Sept.	86	120,633	408	192,352	18	120,633
Oct.	210	389,245	352	187,255	35	88,776
Nov.	290	302,164	148	106,443	15	53,202
Dec.	172	189,934	412	240,023	42	77,371
1948:						
Jan.	56	35,973	481	289,506	69	94,854
Feb.	145	90,023	307	209,015	66	84,839
Mar.	283	189,933	436	271,314	51	101,691
Apr.	82	36,570	651	393,280	52	68,366
May	45	36,109	512	314,432	24	54,191
June	67	36,885	277	211,373	45	41,277
July	120	87,327	205	170,949	15	35,001
Aug.	59	50,511	112	107,431	53	39,607
Sept.	91	67,970	112	83,432	0	0
Oct.	83	67,726	145	181,424	0	0
Nov.	86	49,155	48	36,634	20	10,572
Dec.	83	56,896	106	108,975	24	12,324
1949:						
Jan.	46	29,922	91	93,738	19	11,934
Feb.	65	53,665	77	91,362	9	16,328

Source: U. S. Department of Commerce.

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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1947	508,702	1,093	559,566	11,385	62,366
1948	488,343	15,671	442,072	4,874	115,111
1948:					
Apr.	40,846	.....	34,632	563	78,722
May	42,866	.....	35,268	367	85,734
June	41,207	.....	39,204	264	89,088
July	41,267	9	34,511	257	96,140
Aug.	39,630	3,599	39,339	276	97,197
Sept.	37,890	2,403	39,215	628	98,246
Oct.	41,419	2,014	38,367	451	102,842
Nov.	40,779	1,988	37,690	366	107,297
Dec.	42,133	1,450	35,446	475	115,111
1949:					
Jan.	38,890	927	36,765	623	118,357
Feb.	36,103	1,170	34,611	335	118,932
Mar.	36,063	....	38,839	...	117,229

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072

Exports

1942	222	1,037	..	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62.366
1948	96,282	5,072	10,995	2,762	115,111

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1942	1943	1944	1945	1946	1947	1948	1949
Jan.	42,216	36,085	47,540	52,008	51,746	57,057	61,308	63,083
Feb.	42,666	36,274	47,754	48,856	47,654	50,551	56,487	57,842
Mar.	50,820	41,586	52,263	55,364	56,703	59,947	68,171	.....
Apr.	49,554	48,177	50,005	59,024	62,111	64,140	72,183	.....
May	53,212	49,828	54,230	60,748	66,800	70,865	77,186	.....
June	50,077	53,325	54,266	60,580	63,247	71,329	78,044	.....
July	54,606	49,867	55,119	66,170	60,076	73,441	81,428	.....
Aug.	48,793	51,880	55,618	70,058	66,729	72,089	80,351	.....
Sept.	50,093	49,707	56,318	64,529	62,268	71,384	76,159	.....
Oct.	50,094	53,111	53,154	55,708	66,637	73,277	75,164	.....
Nov.	50,729	50,703	54,967	53,543	61,345	64,158	72,560	.....
Dec.	39,250	48,695	52,250	49,745	61,101	67,506	72,162	.....
Total	589,110	568,238	633,482	696,333	735,417	795,015	871,200	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption—Tons	Consumption—% to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1947:					
Dec.	25,123	25,229	25.4	1,437	35,943
1948:					
Jan.	25,634	25,885	25.5	768	36,307
Feb.	23,678	22,374	25.9	1,273	38,444
Mar.	24,089	24,362	26.0	937	38,313
Apr.	21,802	22,322	26.2	1,049	37,946
May	21,043	21,975	25.2	948	36,612
June	22,504	23,786	25.1	925	35,898
July	17,712	19,291	23.2	712	34,302
Aug.	20,255	22,917	24.7	643	32,025
Sept.	21,805	23,478	25.7	740	30,198
Oct.	23,859	23,512	26.7	848	31,879
Nov.	23,050	22,170	24.8	1,210	33,378
Dec.	21,396	20,122	24.9	900	34,702
1949:					
Jan.	19,741	19,031	21.9	991	32,630
Feb.	18,270	17,712	21.9	1,012	32,738
Mar.	19,972	19,342	21.1	....	33,534

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986				
1931	1,973,090	416,648	2,389,738	1940	3,692,328	721,637	4,413,965
1932	1,135,491	235,187	1,370,678	1941	3,744,500	875,381	4,619,681
1933	1,573,512	346,545	1,920,057	1942	220,814	133,083	353,897
1934	2,177,919	575,192	2,753,111	1943	0	4,501	4,501
1935	3,252,244	694,690	3,946,934	1944	0	124,819	124,819
1936	3,669,528	781,862	4,451,390	1945	83,792	313,643	397,435
1937	3,915,889	892,382	4,808,271	1946	2,148,699	930,760	3,079,459
1938	2,000,985	485,852	2,486,837	1947	3,558,178	1,220,634	4,778,812
1939	2,866,796	704,308	3,571,104	1948	3,909,270	1,363,856	5,273,126
1948:							
Jan.	305,081	99,200	404,281	July	356,764	116,780	473,544
Feb.	274,847	107,054	381,901	Aug.	348,782	111,760	460,542
Mar.	349,998	140,606	490,604	Sept.	301,170	111,224	412,394
Apr.	308,071	128,963	437,034	Oct.	383,756	107,352	491,108
May	225,461	111,789	337,250	Nov.	364,440	103,837	468,277
June	312,406	117,572	429,978	Dec.	378,455	107,702	486,157
1949:							
Jan.	326,019	104,599	430,618	July	.....	.....	.....
Feb.	324,547	101,700	426,247	Aug.	.....	.....	.....
Mar.	402,402	115,171	517,573	Sept.	.....	.....	.....
Apr.	.....	.....	.....	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1944	1945	1946	1947	1948
Passenger Car	1,748,917	4,504,368	15,058,469	21,346,004	23,842,796
Truck & Bus	6,391,441	6,386,652	5,939,244	7,737,353	6,920,231
Agricultural	297,301	1,441,909	1,735,992	2,633,699	3,140,882
Earth Mover	703	1,308	5,520	10,610	13,330
Total	9,138,362	12,434,237	22,739,225	31,727,666	33,917,239

	1948 Oct.	1948 Nov.	1948 Dec.	1949 Jan.	1949 Feb.	1949 Mar.
Passenger Car	1,948,651	2,078,140	2,199,967	2,037,345	1,847,304	2,277,001
Truck & Bus	505,452	529,768	584,768	516,123	497,135	516,577
Agricultural	230,830	263,785	273,831	290,645	283,344	310,204
Earth Mover	394	935	1,629	1,676	1,797	757
Total	2,685,327	2,872,628	3,060,195	2,845,789	2,629,580	3,104,539

Source: The Tire & Rim Association, Inc.

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Natural and Synthetic

Latex and Latex Compounds

for all purposes

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)....	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car.	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car.	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car.	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car.	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car.	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,056	62,871	3,256	91,183	95,550	6,949
Passenger Car.	19,644	52,857	1,608	74,109	77,795	5,444
Truck and Bus	5,412	10,014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49,148	1,787	77,781	81,314	10,698
Passenger Car.	21,589	41,295	656	63,540	66,738	8,773
Truck and Bus	5,256	7,853	1,132	14,241	14,576	1,925
1948:						
Nov. (total)	2,335	3,139	118	5,592	6,098	10,476
Passenger Car.	1,946	2,506	51	4,503	4,980	8,516
Truck and Bus	389	632	67	1,089	1,118	1,960
Dec. (total)	2,299	2,953	191	5,442	5,715	10,722
Passenger Car.	1,897	2,351	72	4,320	4,610	8,789
Truck and Bus	402	601	119	1,122	1,105	1,933
1949:						
Jan. (total)	2,304	2,855	127	5,285	5,896	11,339
Passenger Car.	1,905	2,302	42	4,249	4,772	9,319
Truck and Bus	398	553	85	1,036	1,124	2,020

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton: Tire Cord Not Woven	Cotton: Cord Fabric Woven	Cotton: Chafer and All Other Tire Fabrics	Cotton: Total	Rayon and Nylon [b]: Tire Cord Not Woven	Rayon and Nylon [b]: Tire Cord And Other Tire Fabrics	Rayon and Nylon [b]: Total
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	a	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447
Total	74,689	161,501	74,363	310,553	10,960	201,240	212,200
1947:							
Jan.-Mar.	21,972	49,377	21,815	93,164	5,322	52,059	57,381
Apr.-June	23,491	53,746	16,480	93,717	5,486	47,360	52,846
July-Sept.	15,571	44,291	14,596	74,458	6,161	51,719	57,880
Oct.-Dec.	18,183	48,532	17,762	84,477	6,550	55,078	61,628
Total	79,217	195,946	70,653	345,816	23,519	206,216	229,735
1948:							
Jan.-Mar.	18,546	50,251	19,391	88,188	a	60,569	60,569
Apr.-June	15,585	45,385	18,213	79,183	a	59,759	59,759
July-Sept.	29,743	45,927	c	75,670	a	63,642	63,642
Oct.-Dec.	13,321	34,424	15,879	63,624	a	65,258	65,258
Total	77,195	175,987	53,483	306,665	.....	249,228	249,228

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord not woven.

Automotive Inner Tubes

(Thousands of Units)

	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	6,895	7,213	159	14,267	12,685	6,206
1943	6,350	12,474	189	19,014	15,014	2,626
1944	6,460	20,569	196	27,224	27,488	2,813
1945	5,988	33,906	411	40,304	41,742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,839	40,494	1,125	68,457	70,150	9,734
1948:						
June	2,218	4,421	107	6,745	6,716	9,939
July	2,365	4,365	78	6,807	5,750	8,760
Aug.	2,292	4,522	103	6,917	6,639	8,533
Sept.	2,112	4,007	81	6,200	6,191	8,778
Oct.	2,432	3,537	91	6,061	6,323	8,915
Nov.	2,344	2,694	86	5,123	5,463	9,303
Dec.	2,290	2,308	124	4,722	5,034	9,734
1949:						
Jan.	2,298	2,531	97	4,926	5,062	9,815

Source: The Rubber Manufacturers Association, Inc.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1930	16½	7½	11.98
1911	184	114	141.30	1931	8⅝	4¼	6.17
1912	140	108	121.60	1932	4¾	2½	3.49
1913	113	59	82.04	1933	9⅞	2⅝	5.96
1914	93	56	65.33	1934	15⅞	8¾	12.92
1915	79	58½	65.85	1935	13¾	10½	12.37
1916	102	55	72.50	1936	23	13½	16.41
1917	90	52	72.23	1937	26⅛	14	19.39
1918	70	40	60.15	1938	17⅞	10¼	14.64
1919	57	38½	48.70	1939	24	14⅛	17.57
1920	56½	16	36.30	1940	24	18¼	20.10
1921	21¾	11½	16.36	1941	24⅜	19⅛	22.40
1922	28⅜	13⅝	17.50	1942	22½	22½	22.50
1923	37⅛	24¾	29.45	1943	22½	22½	22.50
1924	40⅛	17⅝	26.20	1944	22½	22½	22.50
1925	121	34⅜	72.46	1945	22½	22½	22.50
1926	88½	36¾	48.50	1946	22½	22½	22.50
1927	41¾	33	37.72	1947	25	14	20.00
1928	41¼	17	22.48	1948	25	18	21.99
1929	26⅞	15½	20.55				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1942	1943	1944	1945	1946	1947	1948	1949
Jan.	19.85	21.34	20.76	22.36	25.49	32.58	36.09	33.37
Feb.	20.05	21.61	21.34	22.29	26.57	33.91	33.63	33.41
Mar.	20.42	21.98	21.65	22.43	27.52	35.89	35.04	33.44
Apr.	21.10	22.02	21.71	21.88	28.40	35.89	38.10	33.84
May	20.88	21.97	21.63	23.30	28.17	36.51	38.57	....
June	19.78	21.92	23.31	23.42	29.89	37.83	38.12	....
July	20.27	21.46	22.33	23.27	34.11	38.03	34.89	....
Aug.	19.45	21.09	22.11	23.10	36.31	34.83	32.23	....
Sept.	19.62	21.10	22.10	23.25	37.59	32.21	31.92	....
Oct.	19.79	21.00	22.32	23.85	36.79	32.39	32.01	....
Nov.	20.21	20.32	22.13	24.71	31.50	34.50	32.15	....
Dec.	20.55	20.32	22.28	25.21	33.03	36.74	32.90	....
Average for Year	20.16	21.34	21.89	23.25	31.28	35.11	34.64	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947	66,430	17,237	73,114	27,064
1948	98,021	31,085	73,598	21,147
1948:				
July	6,893	2,593	4,142	1,368
Aug.	8,291	2,613	5,361	1,834
Sept.	10,298	2,924	5,920	1,845
Oct.	11,364	2,981	5,666	1,859
Nov.	10,099	2,588	6,533	2,014
Dec.	8,761	2,472	7,068	1,808
1949:				
Jan.	10,197	2,847	6,834	2,589
Feb.	9,368	1,979	5,569	2,148

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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(Deflashing by Cold Tumbling)

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(Machine Trimming of Rubber)

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Division of
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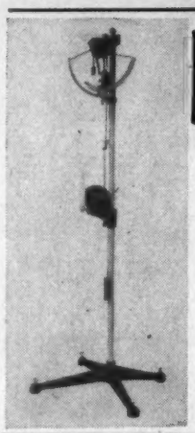

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WRITE FOR SAMPLES AND DATA SHEET

ARGUS CHEMICAL LABORATORY INC.
56 Clifton Place, Brooklyn 5, N. Y.

Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

	1948				1949			
	All Rubber Products		Rubber Tires & Tubes		All Rubber Products		Rubber Tires & Tubes	
Month	Number	Index	Number	Index	Number	Index	Number	Index
Jan.	210	173.5	101	185.5	191	157.8	88	163.0
Feb.	208	172.0	99	182.4	187	154.7	..	....
Mar.	204	168.9	96	177.7	...	....	..	....
Apr.	198	163.8	93	170.7	...	....	..	....
May	195	161.1	91	168.5	...	....	..	....
June	195	161.6	92	169.4	...	....	..	....
July	191	157.7	91	167.6	...	....	..	....
Aug.	195	160.9	92	168.7	...	....	..	....
Sept.	197	162.8	91	168.6	...	....	..	....
Oct.	198	163.5	90	165.9	...	....	..	....
Nov.	199	164.5	91	168.2	...	....	..	....
Dec.	196	161.8	90	165.3	...	....	..	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January-May, 1947, will be shown later.

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	386.3	416.3	354.9	344.4	320.6	294.5
Feb.	385.0	413.3	337.2	315.4	....	....
Mar.	374.3	397.3	320.6	292.4	....	....
Apr.	383.9	414.2	312.8	286.4	....	....
May	367.2	399.3	318.9	305.7	....	....
June	342.3	356.2	330.2	322.0	....	....
July	331.2	350.0	329.7	329.8	....	....
Aug.	337.6	355.5	347.2	341.0	....	....
Sept.	348.3	355.3	344.9	326.2	....	....
Oct.	354.4	354.7	345.5	318.2	....	....
Nov.	361.4	362.4	341.9	312.9	....	....
Dec.	373.6	365.6	332.7	299.6	....	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January, 1946, through May, 1947, will be shown later.

Wages — Average Weekly Earnings

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$54.03	$59.78	$57.33	$62.72	56.93	61.08
Feb.	54.06	59.90	54.70	58.22	56.43	....
Mar.	52.97	58.05	53.24	55.54	....	....
Apr.	55.23	61.64	53.39	56.54	....	....
May	55.30	61.12	55.45	61.15	....	....
June	55.49	61.35	57.14	63.96	....	....
July	55.74	62.06	58.37	66.30	....	....
Aug.	55.92	61.15	60.47	68.29	....	....
Sept.	57.76	64.75	59.31	65.27	....	....
Oct.	57.62	63.78	59.19	64.82	....	....
Nov.	57.99	64.86	58.27	62.79	....	....
Dec.	59.47	65.74	57.75	61.10	....	....

Wages — Average Hourly Earnings

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$1.330	$1.511	$1.444	$1.646	1.502	1.719
Feb.	1.331	1.517	1.421	1.613	1.499	....
Mar.	1.330	1.512	1.408	1.599	....	....
Apr.	1.397	1.608	1.412	1.603	....	....
May	1.416	1.622	1.424	1.636	....	....
June	1.419	1.615	1.439	1.651	....	....
July	1.445	1.640	1.472	1.684	....	....
Aug.	1.445	1.640	1.500	1.730	....	....
Sept.	1.447	1.661	1.504	1.732	....	....
Oct.	1.436	1.644	1.507	1.734	....	....
Nov.	1.453	1.661	1.508	1.735	....	....
Dec.	1.454	1.658	1.501	1.721	....	....

Hours — Average Weekly Hours per Worker

Month	1947	1948	1949	Month	1947	1948	1949
January	40.6	39.7	37.9	July	38.6	39.7	...
February	40.6	38.5	37.6	August	38.7	40.3	...
March	39.8	37.8	...	September	39.9	39.4	...
April	39.5	37.8	...	October	40.1	39.3	...
May	39.0	39.0	...	November	39.9	38.6	...
June	39.1	39.7	...	December	40.9	38.5	...

Source: U. S. Department of Commerce. Note: These figures are revised from time to time and the latest available issue should be consulted for the most accurate data.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1947	1948	1949	Month	1947	1948	1949
Jan.	247	223	191	July	207	200	...
Feb.	246	215	186	Aug.	210	207	...
Mar.	239	205	...	Sept.	217	206	...
Apr.	234	200	...	Oct.	223	205	...
May	220	201	...	Nov.	225	203	...
June	216	205	...	Dec.	230	200	...

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	301	282	287	July	298	339	...
Feb.	326	289	...	Aug.	312	351	...
Mar.	332	252	...	Sept.	346	345	...
Apr.	320	312	...	Oct.	354	330	...
May	309	317	...	Nov.	354	330	...
June	322	342	...	Dec.	307	318	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	229	271	304	July	268	289	...
Feb.	241	283	303	Aug.	258	287	...
Mar.	253	302	...	Sept.	246	288	...
Apr.	270	293	...	Oct.	247	284	...
May	279	296	...	Nov.	242	288	...
June	277	295	...	Dec.	257	289	...

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1941	1942	1943	1944	1945	1946	1947
Asphalt [a]							
Short tons	20,536	22,263	16,510	20,189	19,483	28,715	32,113
% of total	0.6	0.6	0.5	0.6	0.5	0.7	0.7
Barite (Barytes):							
Short tons	9,800	6,334	8,000	10,000	10,000	20,000	17,000
% of total	4.2	3.6	3.9	2.9	2.1	4.4	3.1
Carbon Black:							
Short tons	219,751	147,974	236,737	369,015	402,193	470,732	471,790
% of total	88.5	88.5	90.3	94.6	95.5	95.3	94.3
Clay, Kaolin:							
Short tons	127,055	51,334	50,964	59,588	109,936	162,393	166,201
% of total	11.6	5.1	5.5	6.8	11.7	12.3	11.5
Clay, Fire & Stoneware:							
Short tons	9,000	5,000	10,259	7,160	7,800	12,951	17,970
% of total	0.2	0.1	0.2	0.1	0.1	0.2	0.2
Lead Sulfate, Basic:							
Short tons	200	89	131	268	200	.....	.....
% of total	1.9	1.1	2.3	4.2	5.2	..	..
Lime:							
Short tons	3,058	1,381	2,039	5,634	7,170	3,193	.....
% of total	0.05	0.02	0.05	0.13	0.10	0.1	..
Litharge:							
Short tons	3,968	3,460	4,302	3,023	1,864	2,131	.....
% of total	3.3	3.8	3.8	2.2	1.3	1.6	..
Lithopone:							
Short tons	3,547	1,047	1,078	726	977	1,607	3,085
% of total	2.0	0.8	0.8	0.5	0.7	1.1	1.9
Mica, Ground:							
Short tons	3,476	1,754	3,063	1,137	3,715	4,951	3,900
% of total	8.0	3.7	6.0	2.2	7.1	8.0	6.0
Sulfur:							
Short tons	63,000	40,000	51,000	63,000	64,960	72,800	....
% of total	2.4	1.4	1.8	1.9	2.0	2.2	..
Talc [b]							
Short tons	58,114	40,487	48,994	51,833	63,758*	65,980	.....
% of total	13.9	10.0	11.8	13.0	16.0	14.4	..
Zinc Oxide:							
Short tons	90,429	52,717	67,898	59,518	63,447	83,776	.....
% of total	63.4	53.0	47.4	42.3	49.6	53.1	..

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes pyrophyllite and ground soapstone. * Revised.

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High tensile liquor finish hose reinforcement wire for high pressure hydraulic hose of wire braided type. Prompt shipment.

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POSITIONS WANTED

SALES-DEVELOPMENT ENGINEER, M.E. Varied Detroit contacts. Ten years synthetic and natural rubber, automotive mechanicals, laboratory research evaluation, plastics. Metropolitan New York preferred. Will travel. Address Box 414-P, RUBBER AGE.

TECHNICAL SALES: Position desired in chemical field by rubber chemist with experience and background in chemical sales, sales surveys to the rubber and allied fields. Experience also includes compounding, production, and development. Broad acquaintance in the industry. Address Box 423-P, RUBBER AGE.

RUBBER CHEMIST, over eight years experience, desires responsible position in production and/or development. Experienced in compounding production, development, processing, supervision, and sales service, extrusion in bonding mediums, molded goods, and other mechanicals. Address Box 424-P, RUBBER AGE.

LATEX FOAM TECHNOLOGIST

Chemical Engineer with eleven years experience on latex foam, research, process development, control, product design and plant superintendence. Experienced administrator with proven abilities desires connection with progressive latex processing organization in plant, administration, or sales work. Address Box 425-P, RUBBER AGE.

SALES MANAGER seeks a change, now employed by a smaller plant making molded mechanical goods and sponge rubber. Fourteen years experience, widely known in industry, knows mold engineering and production problems. Prefer Midwest location. Address Box 429-P, RUBBER AGE.

CHEMICAL ENGINEER with sixteen years experience, ten years as development tire compounder with major rubber company. Well grounded in factory processing and quality control. Six years as technical service representative of a well known carbon company. Desire responsible position with a future. Address Box 430-P, RUBBER AGE.

LATEX CHEMIST, twenty years experience, desires responsible position in production and/or development with small growing concern. Research and development compounding experience in natural and synthetic latices for sponge, thread, dipped goods, etc. At present employed in Midwest. Age forty-three, single, can travel. Location immaterial. Can furnish best references. Address Box 431-P, RUBBER AGE.

COATING PLANT FOREMAN with twelve years compounding and coating experience along adhesive tape lines, also some knowledge of rubber cements. Age thirty-five, married. Enthusiastic, energetic, honest, and dependable. Address Box 432-P, RUBBER AGE.

SUPERINTENDENT-CHEMIST, now employed, desires new connection. More than twenty years experience in heavy and light mechanicals. Research, production, control, costs. Small plant West Coast preferred. Address Box 433-P, RUBBER AGE.

CHEMICAL ENGINEER, experienced in laboratory, development, and production of molded and extruded mechanicals, soles and heels, sponge, and inner tubes. Wish position as chemist, trouble shooter, or supervisor. Age forty-four. Address Box 436-P, RUBBER AGE.

CHIEF RESEARCH & DEVELOPMENT CHEMIST & ENGINEER desires change with company offering scope for initiative and progress. Twelve years experience at home and abroad in research, development, factory processing and control, production, departmental management in wire and cables, molded, extruded and mechanical goods in rubber and plastics. Age thirty-one, graduate. Address Box 437-P, RUBBER AGE.

WIRE PLANT SUPERINTENDENT, over twenty years experience manufacturing telephone wire, building wire, cord sets. Plastic and rubber. Thorough knowledge of braiding, weatherproofing, mill room, and extrusion. Or will consider position as department supervisor with growing concern. Immediately available. Address Box 438-P, RUBBER AGE.

POSITIONS WANTED (Continued)

TECHNICAL SUPERINTENDENT-PRODUCTION MANAGER desires new connection. Over twenty years of practical experience in large and small plants manufacturing all kinds of mechanical rubber goods including sponge rubber. Location in West desired. Address Box 440-P, RUBBER AGE.

SUPERINTENDENT and COMPOUNDER. Twenty-four years experience in molding, extruding, calendering, and mixing. Age forty-one. Location immaterial. Available immediately. Address Box 445-P, RUBBER AGE.

CHEMIST-EXECUTIVE with over twenty years experience, fifteen years as chemist, compounder, process and development engineer including mold design and general factory engineering. Six years as Chief Chemist and Assistant Factory Manager, tires, tubes, mechanicals, flooring. Address Box 446-P, RUBBER AGE.

RUBBER COMPOUNDING ENGINEER: Five years diversified process development experience in rubber compounding and oil refining. Participated in start-up of new rubber compounding plant. Ability to work with people and assume responsibility. B.S. Chem. Eng. 1943. Single, age twenty-seven. Interested in process development or technical service connection. Address Box 447-P, RUBBER AGE.

RUBBER CHEMIST: Twelve years general rubber experience in compounding, laboratory-plant operations of footwear, molded and tubed natural and synthetic mechanical goods. Desires position as assistant chemist. Vicinity Boston or New England states preferred. Address Box 448-P, RUBBER AGE.

HELP WANTED

EXPERIENCED CHEMIST wanted for research work on latices for the industrial field. Excellent opportunity for one who has this experience. Address Box 109-C, RUBBER AGE.

PRODUCTION MAN for small latex dipped goods plant, making toy balloons exclusively. Must have thorough knowledge of all phases of dipped goods production. Kindly reply giving experience, salary expected, etc. Address Box 418-W, RUBBER AGE.

RUBBER COMPOUNDER and DESIGNER, experience in braided hose and belting essential. State age, height, weight, education, and job background, with previous salaries earned. Address Box 419-W, RUBBER AGE.

SALES REPRESENTATION wanted by established rubber manufacturer selling all types of industrial rubber products, molded rubber to metal adhesion, rolls and rollers, tank lining, pulley lagging, etc. Commission basis. Prefer men now contacting industrial trade with allied lines. Territories open: Northern Ohio, Pennsylvania, New York, New England, Maryland, West Virginia, Southern Ohio, and Southern Illinois. Address Box 427-W, RUBBER AGE.

SPONGE RUBBER EXPERT. Must have complete knowledge and recent experience in all phases of sponge rubber manufacture. We cannot afford to experiment but are willing to pay top salary for abiltiy and experience. Permanent position. Plant located Eastern Pennsylvania. To be considered, state age, salary requirement, and list references in first letter. Address Box 444-W, RUBBER AGE.

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WANTED—Large engineering firm wishes to acquire several complete rubber plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Address Box 1212, 1475 Broadway, New York 18, N. Y.

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WANTED: #3A Banbury Mixer, 60″ Calender, heavy duty Hydraulic Presses. Address Box 442-E, RUBBER AGE.

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Calender: 2 heated rolls, 72″ face, 12″ diameter, almost new; Embossing Calender: Skiver Grain 60″ face, 3 rolls; 6 Aero Fin 3′ x 9′ Heating Units; Air Compressor, new head; Sanding Machine and Blower; 2 Rubber Churns. Clutches, Drives, Sprockets, Sheaves, Gears, etc. Suitable for Coating Plant. Boston area location. Address Box 416-S, RUBBER AGE.

FOR SALE: Two American Tool Company doublers, one 60″ wide, the other 72″ wide; steel roll against rubber roll; good condition; reasonably priced; will sell separately; complete with clutches and drive pulleys. One Black Rock Model 4-LM Roller Grinding Machine for polishing rubber rollers. Address Box 426-S. RUBBER AGE.

FOR SALE: One new 60″ Spreader; one 72″ Beamer; new 60″ Measuring and Tubing Machine; one Butterworth three-roll 50″ Calender. All equipment in excellent working order. These machines can be moved immediately. Address Box 443-S RUBBER AGE.

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FOR SALE: Two #9 Banbury Mixers complete, with or without motor and control. Both have been entirely rebuilt. Write or wire INTERSTATE WELDING SERVICE, 914 Miami Street, Akron 11, Ohio.

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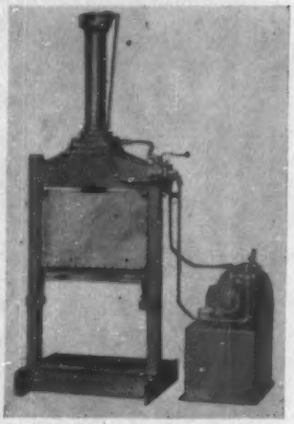

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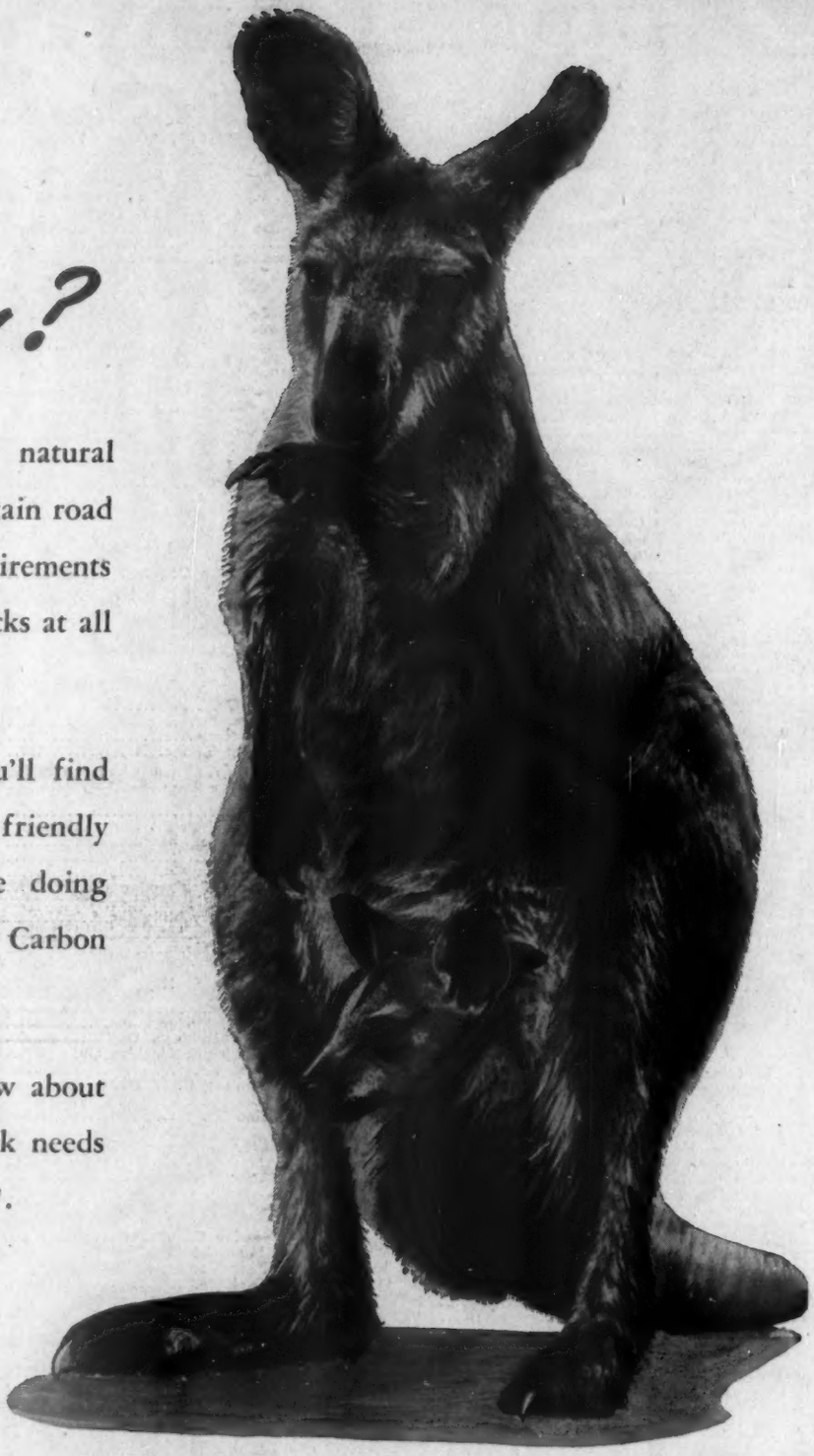

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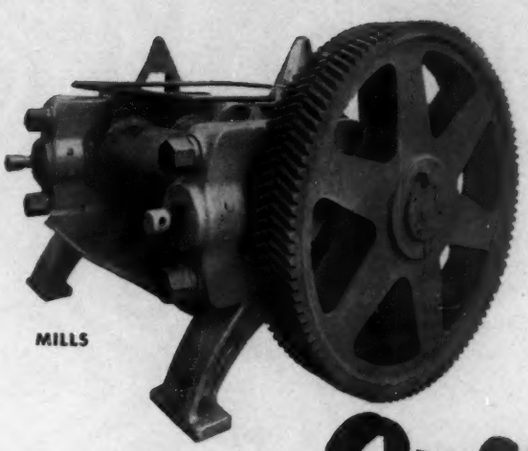

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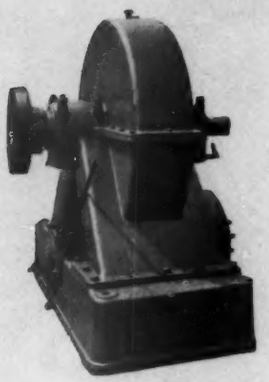

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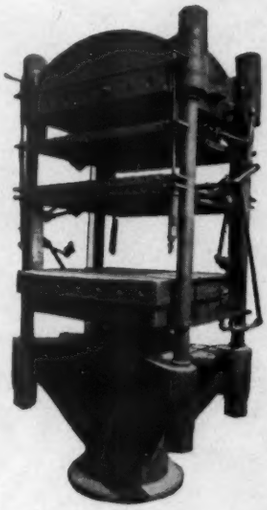

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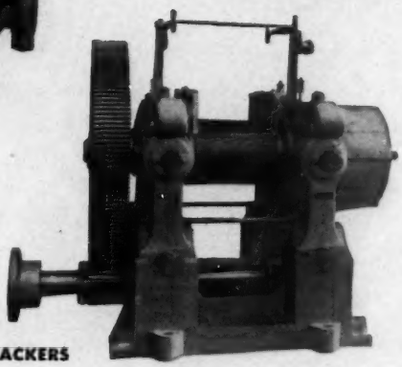

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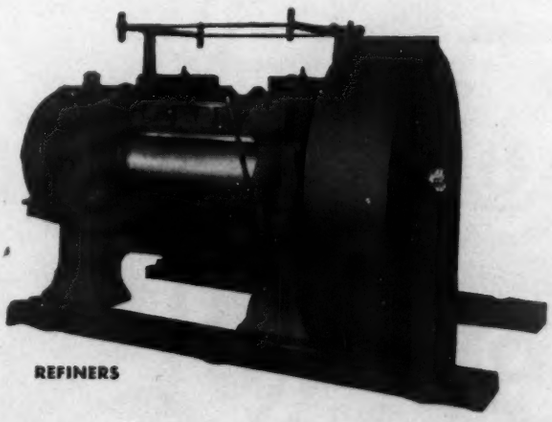

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